DOCUMENT 00 0101

PROJECT MANUAL

for

FIRE STATION #44 REPLACEMENT PROJECT

at
501 Stetson Street
Moss Beach, CA 94038

COASTSIDE FIRE PROTECTION DISTRICT

Coastside Fire Protection District
1191 Main Street
Half Moon Bay, CA 94019

Advertisement Date: Thursday, September 24, 2026

Non-Mandatory Pre-Bid Site Visit: Thursday, October 1, 2026 at 1:00 P.M.

Bid Opening Date: Tuesday, October 20, 2026 at 2:00 P.M.

DOCUMENT 00 0110

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END OF DOCUMENT

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(See Project Plans & Specifications for List of Drawings, Tables, Schedules, and Technical Specifications)

END OF DOCUMENT

DOCUMENT 00 1113

NOTICE INVITING BIDS

(<u>For Pre-Qualified Contractors Only</u>)

ARTICLE 1 INVITATION TO BID

1.01 Notice Inviting Bids: Owner previously conducted a pre-qualification process for prospective bidders for the below referenced project. Owner will receive sealed Bids from pre-qualified contractors at the **Coastside Fire Protection District** Office, located at **1191 Main Street, Half Moon Bay, California 94019** until **2:00 PM** on **Tuesday, October 20, 2026,** for the following public work:

COASTSIDE FIRE PROTECTION DISTRICT

Fire Station #44 Replacement Project
501 Stetson Street
Moss Beach, CA 94038

1.02 Project Description: The Project includes, but is not necessarily limited to, demolishing the existing one-story Fire Station 44 at 501 Stetson Street in Moss Beach, CA and building in its place a new two-story, 10,178 sq. ft. fire station building, containing living quarters, apparatus bay, technical support areas, and other necessary facilities, on a 21,695 sq. ft. lot. Site work includes the fire station structure, retaining walls around the site's perimeter, adequate parking for personnel, front driveway apron, landscaping, utility infrastructure including water and sewer main relocation, generator and fuel tank, site lighting, entry patio, and other work as shown on the Plans and described in the Specifications. Work shall be completed to Substantial Completion within **<u>500 Calendar Days</u>** from the date when Contract Time commences to run. Work shall be completed to Final Completion within **<u>45 Calendar Days</u>** from the date of Substantial Completion.

1.03 Procurement of Bidding Documents: Bidding Documents contain the full description of the Work. Bidders may examine a complete hard-copy set of the Bidding Documents at the Coastside Fire Protection District, 1191 Main Street, Half Moon Bay, CA 94019. Bidders can download documents at https://www.coastsidefire.org/bulletin-abba26b.

1.04 Instructions: Bidders shall refer to Document 00 2113 (Instructions to Bidders) for required documents and items to be submitted in a sealed envelope for deposit into the Bid Box at the location, and no later than the time and date, set forth in Paragraph 1.01 above.

1.05 Non-Mandatory Pre-Bid Site Visit: <u>There is a Non-Mandatory Pre-Bid Site Visit for this Project</u>. The Mandatory Pre-Bid Site Visit for this project shall be on Thursday, October 1, 2026 at 1:00 P.M. at 501 Stetson Street, Moss Beach, CA 94038.

1.06 Bid Preparation Cost: Bidders are solely responsible for the cost of preparing their Bids.

1.07 Reservation of Rights: Owner specifically reserves the right, in its sole discretion, to reject any or all Bids, to re-bid, or to waive inconsequential defects in bidding not involving time, price or quality of the work. Owner may reject any and all Bids and waive any minor irregularities in the Bids.

1.08 Portion of Work to be Performed by Contractor: The successful bidder shall self-perform no less than **<u>20%</u>** of the Work described in the Contract Documents utilizing its own work force, excluding Specialty Items. Work can include, but is not necessarily limited to, general conditions, project management, overhead and profit. Specialty items may require specialized licenses.

ARTICLE 2 LEGAL REQUIREMENTS

2.01 Required Contractor's License(s): A California **Class A or Class B** contractor's license is required to bid this contract. Joint ventures must secure a joint venture license prior to award of

this Contract. Specialty work may require a specialty contractor's license held by Bidder or a listed subcontractor.

2.02 Required Contractor and Subcontractor Registration

A. Owner shall accept Bids only from Bidders that (along with all Subcontractors listed in Document 00 4330, Subcontractor List) are currently registered and qualified to perform public work pursuant to Labor Code Section 1725.5.

B. Subject to Labor Code Sections 1771.1(c) and (d), any Bid not complying with paragraph 2.02A above shall be returned and not considered; provided that if Bidder is a joint venture (Business & Professions Code Section 7029.1) or if federal funds are involved in the Contract (Labor Code Section 1771.1(a)), Owner may accept a non-complying Bid provided that Bidder and all listed Subcontractors are registered at the time of Contract award.

2.03 Bid Alternates: NONE

2.04 Non-Substitutable Materials, Products, Things, or Services:

A. Non-substitutable items are identified as follows: **ALERTING SYSTEM**

2.05 Substitution of Securities: Owner will permit the successful bidder to substitute securities for any retention monies withheld to ensure performance of the contract, as set forth in Document 00 6290 Escrow Agreement For Security Deposits In Lieu Of Retention and incorporated herein in full by this reference, in accordance with Section 22300 of the California Public Contract Code.

2.06 Prevailing Wage Laws: The successful Bidder must comply with all prevailing wage laws applicable to the Project, and related requirements contained in the Contract Documents. Copies of the general prevailing rates of per diem wages for each craft, classification, or type of worker needed to execute the Contract, as determined by Director of the State of California Department of Industrial Relations, may be obtained from the California Department of Industrial Relations website [http://www.dir.ca.gov/OPRL/DPreWageDetermination.htm] and are deemed included in the Bidding Documents. Upon request, Owner will make available copies to any interested party. Also, the successful Bidder shall post the applicable prevailing wage rates at the Site.

2.07 Prevailing Wage Monitoring: This Project is subject to prevailing wage compliance monitoring and enforcement by the Department of Industrial Relations.

END OF DOCUMENT

DOCUMENT 00 2100

ACCESS, INDEMNITY AND RELEASE AGREEMENT
(If Invasive Testing is Allowed)

Dated _____

POTENTIAL CONTRACTOR: _____

OWNER: COASTSIDE FIRE PROTECTION DISTRICT

SITE: 501 Stetson Street, Moss Beach, CA 94038

PROJECT: Fire Station #44 Replacement Project

In consideration of the above-referenced Owner's permitting the undersigned potential Contractor (**Contractor**) to have access to, and to conduct investigations, tests and/or inspections on the Site (**access**), and effective upon such access, Contractor hereby agrees as follows:

1.01 To the greatest extent permitted by law including, without limitation, California Civil Code Section 2782, Contractor hereby releases, and shall defend, indemnify, and hold harmless Owner, and its officers, employees, consultants, representatives, and agents, and all other parties having any other interest in the Site, against any claim or liability, including attorney's fees, arising from or relating to any Site-related access, investigation, test, inspection and/or other activity conducted by Contractor or any of Contractor's officers, employees, consultants, representatives, and/or agents, regardless of whether claim or liability is caused in part by the negligence of Owner or by any released and indemnified party.

1.02 Contractor hereby waives the provisions of California Civil Code Section 1542, which provides as follows:

> A general release does not extend to claims which the creditor does not know or suspect to exist in his or her favor at the time of executing the release, which if known by him or her must have materially affected his or her settlement with the debtor.

1.03 Contractor shall repair any damage to the Site or adjacent property resulting from activities authorized hereunder, and comply with and be subject to all other requirements and obligations described or referenced in Document 00 3132 (Geotechnical Data and Existing Conditions).

1.04 Attached hereto (or to be delivered separately before Contractor's visit to the Site) is a certificate for general liability insurance satisfying Contract Documents requirements.

1.05 Although this Access, Indemnity and Release Agreement is not a Contract Document (see Document 00 5200 [Agreement]), it shall be fully effective and binding regardless of whether Contractor submits a Bid for the subject Project, is awarded a contract for the Project, or otherwise.

CONTRACTOR: _____

By: _____
Signature

Its: _____
Title (If Corporation: Chairman, President or Vice President)

By: _____
Signature

Its: _____
Title (If Corporation: Secretary, Assistant Secretary, Chief Financial Officer or Assistant Treasurer)

END OF DOCUMENT

DOCUMENT 00 2113

INSTRUCTIONS TO BIDDERS

Bids from pre-qualified bidders are requested by Owner, for a general construction contract, or work described in general, as set forth in Document 00 1113 (Notice Inviting Bids), and the following additional terms.

ARTICLE 1 - PROCEDURES FOR SUBMISSION OF BIDS

1.01 Required Pre-Bid Conference and Site Visit:

A. Owner will conduct Pre-Bid Conference and Site Visit at the date, time and location indicated in Document 00 1113 (Notice Inviting Bids), to consider such matters as Bidders may request and perform a Site Visit immediately following, at the Site. If a mandatory Pre-Bid conference is specified in Document 00 1113, Bidders must attend the Pre-Bid Conference and Site Visit and sign an attendance roster as a condition to bidding.

B. The Site Visit may be the Bidders' only opportunity to investigate conditions at the Site. Other Pre-Bid Site Visits may be scheduled at Owner's sole discretion, depending on staff availability.

C. Owner will issue Minutes of the Pre-Bid Conference, which shall constitute the sole and exclusive record and statement of the results of the Pre-Bid Conference. The Minutes issued by Owner are not Contract Documents.

1.02 Required Pre-Bid Investigations:

A. Prior to submission of Bid, Bidder must conduct a careful examination of Bidding Documents and understand the nature, extent, and location of Work to be performed. Refer to Document 00 7200 (General Conditions) on required pre-bid investigations.

B. Any Bidder wishing to investigate subsurface conditions or otherwise conduct invasive investigations, explorations, test, or studies at this Site before bidding, shall schedule such examinations with Owner by providing Owner at least seven (7) days advanced written notice. Additionally, any such Bidder must deliver an executed Document 00 2100 (Access, Indemnity and Release Agreement) and provide an insurance certificate as described therein by noon of the Day prior to the site examination. Bidders who intend only to observe Site conditions and not conduct such examinations are not required to provide an executed Document 00 2100 or an insurance certificate.

C. Bidders may examine any available existing conditions information (e.g., record documents, specifications, studies, drawings of previous work), as well as applicable environmental assessment information (if any) regarding the Project, by giving Owner reasonable advanced notice. Owner will make copies available for a fee. A Bidder must give five (5) days advanced notice if copies are desired.

1.03 Bidder Questions and Answers:

A. Bidders must direct all questions about the meaning or intent of Bidding Documents to Owner in writing. Interpretations or clarifications considered necessary by Owner in response to such questions will be issued by written Addenda mailed, faxed, or delivered to all parties recorded by Owner as having received Bidding Documents. Owner may not answer questions received less than ten Days prior to the date for opening Bids.

B. Only questions answered by formal written Addenda will be binding. Oral and other interpretations or clarifications will be without legal effect, and Bidders shall not rely on oral statements.

1.04 Addenda:

A. Addenda may also be issued to modify the Bidding Documents as deemed advisable by Owner. Addenda shall be acknowledged by number in Document 00 4113 (Bid Form) and shall be part of the Contract Documents. A complete listing of Addenda may be secured from Owner.

ARTICLE 2 - RECEIPT OF BIDS

2.01 Date and Time:

A. Sealed Bids will be received by the Owner until the date and time indicated in Document 00 1113 (Notice Inviting Bids). All Bid envelopes will be time-stamped to reflect their submittal time. Owner shall reject all Bids received after the specified time and will return such Bids to Bidders unopened. Bidders must submit Bids in accordance with this Document 00 2113.

2.02 Two Envelope Bid Submission:

A. Owner will receive Bids in opaque sealed 10 inch x 13 inch envelopes, containing the required items described herein.

B. **Omitted.**

C. Bidders should mark their Bid envelopes using the name, address, identifying information and contract number, indicated in Document 00 1113 (Notice Inviting Bids).

2.03 Required Contents of "Envelope A – Bid Submittals":

A. Document 00 4113 (Bid Form). Bidders must submit Bids on Document 00 4113 (Bid Form) in accordance with the provisions of Document 00 4113. Bidders must complete all Bid items and supply all information required by Bid documents and specifications.

B. Document 00 4313 (Bond Accompanying Bid). Bidders must submit Document 00 4313 (Bond Accompanying Bid) accompanied by a cashier's check, certified check (certified without qualification and drawn on a solvent bank of the State of California or a National Bank doing business in the State of California) or completed form of Document 00 4313 of not less than 10% of the base Bid, payable to Owner and completed in accordance with the provisions of Document 00 4313.

C. **Omitted.**

D. Document 00 4330 (Subcontractor List). Bidders must submit Document 00 4330 (Subcontractors List) completed in accordance with the provisions of Document 00 4330. The Subcontractors List must include the names of all subcontractors for those subcontractors who will perform any portion of work, including labor, rendering of service, or specially fabricating and installing a portion of the work or improvement according to detailed drawings contained in the plans and specifications, in excess of one half of one percent (0.5%) of the total Bid amount. Any violation of this requirement may result in a Bid being deemed non-responsive and not being considered.

E. Document 00 4519 (Non-Collusion Affidavit). Bidders must submit Document 00 4519 (Non-Collusion Affidavit) completed in accordance with the provisions of Document 00 4519.

F. Document 00 4546 (Bidder Certifications). Bidders must submit Document 00 4546 (Bidder Certification) completed in accordance with the provisions of Document 00 4546.

G. In-Use Off-Road Diesel-Fueled Fleets Regulation Compliance. Each bidder must obtain and submit valid Certificate(s) of Reported Compliance for its fleet and the fleets of listed subcontractors pursuant to Cal. Code of Regs., Title 13, Div. 3, Ch. 9, Sec. 2449. If no vehicles subject to these requirements shall be used by either bidder or its listed subcontractors, bidder shall include with its bid a statement indicating that no vehicle subject to these requirements shall be used, and/or a detailed explanation of any exemptions to the regulations.

ARTICLE 3 BID OPENING AND EVALUATION

3.01 Determination of Apparent Low Bidder:

A. Owner will open each Bid at the time and place indicated in Document 00 1113 (Notice Inviting Bids), initially evaluate them for responsiveness, and determine an Apparent Low Bidder as specified herein and in Document 00 1113 (Notice Inviting Bids) and Document 00 4113 (Bid Form).

B. Apparent Low Bid will be determined solely on the total amount of all Bid items based on terms contained in Document 00 1113 (Notice Inviting Bids) and Document 00 4113 (Bid Form), or as set forth in Paragraph 2.02 of Document 00 1113 (Notice Inviting Bids). All Bidders are required to submit Bids on all Bid items (including any alternates).

C. **Omitted.**

D. If Apparent Low Bidder is determined to be non-responsive or non-responsible, then Owner may proceed to the next Apparent Low Bidder's Bid pursuant to any procedures determined in its reasonable discretion, and proceed for all purposes as if this Apparent Low Bidder were the original Apparent Low Bidder.

3.02 Evaluation of Bids:

A. Bids must be full, complete, clearly written and using the required forms. Bidders shall make any change in the Bid by crossing out the original entry, entering and initialing the new entry. Bidder's failure to submit all required documents strictly as required entitles Owner to reject the Bid as non-responsive. All Bidders must submit Bids containing each of the fully executed documents supplied in this Project Manual. (This is where I ended on 9/12/26)

B. In evaluating Bids, Owner will consider Bidders' qualifications whether or not the Bids comply with the prescribed requirements, unit prices, and other data, as may be requested in Document 00 4113 (Bid Form) or prior to the Notice of Award.

C. Owner may conduct reasonable investigations and reference checks of Bidder and other persons and organizations as Owner deems necessary to assist in the evaluation of any Bid and to establish Bidder's responsibility, qualifications, financial ability and ability to perform the Work in accordance with the Contract Documents to Owner's satisfaction within the prescribed time. Submission of a Bid constitutes Bidder's consent to the foregoing.

D. Owner shall have the right to consider information provided by sources other than Bidder. Owner shall also have the right to communicate directly with Bidder's surety regarding Bidder's bonds.

E. Discrepancies between the multiplication of units of Work and unit prices will be resolved in favor of the unit prices. Discrepancies between the indicated sum of any column of figures and the correct sum thereof will be resolved in favor of the correct sum. Discrepancies between written words and figures will be resolved in favor of the words.

F. Bids shall be deemed to include the written responses of the Bidder to any questions or requests for information of Owner made as part of Bid evaluation process after submission of Bid.

3.03 Reservation of Rights:

A. Owner reserves the right to reject any or all nonconforming, non-responsive, unbalanced, or conditional Bids, and to reject the Bid of any Bidder as non-responsive as a result of any error or omission in the Bid, or if Owner believes that it would not be in the best interest of Project to make an award to that Bidder, whether because the Bid is not responsive or the Bidder is unqualified or of doubtful financial ability or fails to meet any other pertinent standard or criteria established by Owner. For purposes of this paragraph, an "unbalanced Bid" is one having nominal prices for some Bid items and enhanced prices for other Bid items.

B. Owner may retain Bid securities and Bid bonds of other than the Apparent Low Bidder for a period of 90 Days after award or full execution of the Contract, whichever first occurs.

C. Owner may reject any or all Bids and waive any informalities or minor irregularities in the Bids. Owner also reserves the right, in its discretion, to reject any or all Bids and to re-Bid the Project.

3.04 Required Contractor and Subcontractor Registration:

A. Owner shall accept Bids only from Bidders that (along with all Subcontractors listed in Document 00 4330, Subcontractor List) are currently registered and qualified to perform public work pursuant to Labor Code Section 1725.5.

B. Subject to Labor Code Sections 1771.1(c) and (d), any Bid not complying with paragraph 3.04.A, above, shall be returned and not considered; provided that if Bidder is a joint venture (Business & Professions Code Section 7029.1) or if federal funds are involved in the Contract (Labor Code Section 1771.1(a)), Owner may accept a non-complying Bid provided that Bidder and all listed Subcontractors are registered at the time of Contract award.

ARTICLE 4 MANDATORY BID PROTEST PROCEDURES

4.01 Submission of Written Bid Protest:

A. Any Bid protest in connection with the construction contract or work described in general in Document 00 1113 (Notice Inviting Bids) must be submitted in writing to the **District's Authorized Representative, located at 1191 Main Street, Half Moon Bay, CA 94019**, before 3:30 P.M. of the fifth Business Day following posting of Document 00 5050 (Notice of Intent to Award for Construction) at **1191 Main Street, Half Moon Bay, CA 94019.** Owner will use reasonable efforts to deliver by facsimile a copy of Document 00 5050 to all Bidders who submitted Bids no later than the Business Day after issuance, although any delay or failure to do so will not extend the Bid protest deadline described above.

B. The initial protest document must contain a complete statement of the basis for the protest.

C. The protest must refer to the specific portion of the document that forms the basis for the protest.

D. The protest must include the name, address, and telephone number of the person representing the protesting party.

E. Only Bidders who the Owner otherwise determines are responsive and responsible are eligible to protest a Bid; protests from any other Bidder will not be considered. In order to determine whether a protesting Bidder is responsive and responsible, Owner may evaluate all information contained in any protesting Bidder's Bid, and conduct the same investigation and evaluation as Owner is entitled to take regarding an Apparent Low Bidder.

F. The party filing the protest must concurrently transmit a copy of the initial protest document and any attached documentation to all other parties with a direct financial interest that may be adversely affected by the outcome of the protest. Such parties shall include all other Bidders who appear to have a reasonable prospect of receiving an award depending upon the outcome of the protest.

4.02 Exclusive Remedy:

A. The procedure and time limits set forth in this paragraph are mandatory and are Bidder's sole and exclusive remedy in the event of Bid protest. Bidder's failure to comply with these procedures shall constitute a waiver of any right to further pursue the Bid protest, including filing a Government Code Claim or legal proceedings. A Bidder may not rely on a protest submitted by another Bidder, but must timely pursue its own protest.

ARTICLE 5 AWARD AND EXECUTION OF CONTRACT

5.01 Notice of Award and Submittal of Executed Contract Documents:

A. If Contract is to be awarded, it will be awarded to the lowest responsible responsive Bidder. Owner will issue Document 00 5100 Notice of Award. Such Award, if made, will be made within ninety (90) days after the opening of the Bid Proposals.

B. Successful Bidder must execute and submit to Owner the "Required Contract Documents and Proof of Insurance" set forth below, by 5:00 p.m. of the 20th Day following the Notice of Award.

5.02 Required Contract Documents and Proof of Insurance:

A. Document 00 5200 (Agreement), fully executed by successful Bidder. Submit four originals, each bearing an original signature on the signature page and initials on each page.

B. Document 00 6113.13 (Construction Performance Bond), fully executed by successful Bidder and surety, in the amount set forth in Document 00 6113.13. Submit one original.

C. Document 00 6113.16 (Construction Labor and Material Payment Bond), fully executed by successful Bidder and surety, in the amount set forth in Document 00 6113.16. Submit three originals.

D. Document 00 6536 (Guaranty), fully executed by successful Bidder. Submit one original, bearing an original signature on the signature page and initials on each page.

E. Insurance certificates and endorsements required by Document 00 7316 (Supplementary Conditions—Insurance): Submit one original set.

F. Any other items identified by Owner in Document 00 5100 (Notice of Award).

5.03 Failure to Execute and Deliver Documents:

A. If Bidder to whom Contract is awarded, within the period described in this Document 00 2113, fails or neglects to execute and deliver all required Contract Documents and file all required bonds, insurance certificates, and other documents, Owner may, in its sole discretion, rescind the award, recover on Bidder's surety bond, or deposit Bidder's cashier's check or certified check for collection, and retain the proceeds thereof as liquidated damages for Bidder's failure to enter into the Contract Documents. Bidder agrees that calculating the damages Owner may suffer as a result of Bidder's failure to execute and deliver all required Contract Documents would be extremely difficult and impractical and that the amount of Bidder's required Bid security shall be the agreed and presumed amount of Owner's damages.

B. Upon such failure to timely deliver all required Contract Documents as set forth herein, Owner may determine the next Apparent Low Bidder and proceed accordingly. Such Award, if made, will be made within ninety (90) days after the opening of the Bid Proposals.

ARTICLE 6 GENERAL CONDITIONS AND REQUIREMENTS

6.01 Modification of Commencement of Work:

A. Owner expressly reserves the right to modify the date for the Commencement of Work under the Contract and to independently perform and complete work related to Project. Owner accepts no responsibility to Contractor for any delays attributed to its need to complete independent work at the Site.

B. Owner shall have the right to communicate directly with Apparent Low Bidder's proposed performance bond surety, to confirm the performance bond. Owner may elect to extend the time to receive faithful performance and labor and material payment bonds.

6.02 Conformed Project Manual:

A. Following Award of Contract, Owner may prepare a conformed Project Manual reflecting Addenda issued during bidding, which will, failing objection, constitute the approved Project Manual.

6.03 Payment Bond:

A. If the Project described in Document 00 1113 (Notice Inviting Bids) involves an expenditure in excess of twenty-five thousand dollars ($25,000), the successful Bidder must file a payment bond with and approved by Owner prior to entering upon the performance of the Work, in accordance with Civil Code Section 9550, *et seq*.

6.04 Wage Rates:

A. Copies of the general prevailing rates of per diem wages for each craft, classification, or type of worker needed to execute the Contract, as determined by Director of the State of California Department of Industrial Relations may be obtained from the California Department of Industrial

Relations website [http://www.dir.ca.gov/OPRL/DPreWageDetermination.htm] and are deemed included in the Bidding Documents. Upon request, Owner will make available copies to any interested party. Also, Contractor shall post the applicable prevailing wage rates at the Site.

6.05 Withdrawal of Bids:

A. Bidders may withdraw their Bids at any time prior to the Bid opening time fixed in this Document 00 2113, only by written request for the withdrawal of Bid filed with Owner **at 1191 Main Street, Half Moon Bay, CA 94019.** Bidder or its duly authorized representative shall execute the request to withdraw Bid.

6.06 Ineligible Contractors and Subcontractors:

A. Owner shall not accept a Bid from a Bidder who was not pre-qualified to bid, or who is ineligible to bid or work on, or be awarded, a public works project pursuant to California Labor Code section 1777.1 or 1777.7. Bidders and the Contractor who is awarded the project contract shall not utilize, or allow work by, any subcontractor who is ineligible to bid or work on, or be awarded, a public works project pursuant to California Labor Code Section 1777.1 or 1777.7. (See California Public Contract Code Section 6109.) The California Division of Labor Standards Enforcement publishes a list of debarred contractors and subcontractors on the Internet at www.dir.ca.gov/DLSE/debar.html.

6.07 Public Records Act Requests:

A. Per the Public Records Act, Owner will make available to the public all correspondence and written questions submitted during the Bid period, all Bid submissions opened in accordance with the procedures set forth herein, and all subsequent Bid evaluation information. Except as otherwise required by law, Owner will not disclose trade secrets or proprietary financial information submitted by Bidders that has been designated as confidential by Bidder. Any such trade secrets or proprietary financial information that Bidder believes should be exempted from disclosure shall be specifically identified and marked as such. Blanket-type identification by designating whole pages or sections shall not be permitted and shall be invalid. The specific confidential information must be clearly identified as such.

B. Upon a request for records marked by Bidder as exempt from disclosure, Owner will notify the Bidder involved, within ten Days from receipt of the request, when the records will be made available for inspection. If the Bidder timely identifies any “proprietary, trade secret, or confidential commercial or financial” information that Bidder determines is not subject to public disclosure, and requests that Owner refuse to comply with the records request, Bidder shall take all appropriate legal action and defend Owner’s refusal to produce the information in all forums; otherwise Owner will make such information available to the extent require by applicable law, without restriction.

C. Information disclosed in the Bid are the property of Owner unless Bidder makes specific reference to data that is considered proprietary. Subject to the requirements in the Public Records Act, reasonable efforts will be made to prevent the disclosure of information except on a need-to-know basis during the evaluation process.

6.08 Substitutions:

A. Bidders must base their Bids on products and systems specified in Contract Documents or listed by name in Addenda. Owner will consider substitution requests only for “or equal items.” Bidders wanting to use “or equal” item(s) may submit Document 00 6325 (Substitution Request Form) no later than 35 calendar Days after Notice of Award. As a limitation on Bidder's privilege to request substitution of “or equal” items, Owner has found that certain items are designated as Owner standards and certain items are designated to match existing items in use on a particular public improvement either completed or in the course of completion or are available from one source. As to such items, Owner will not permit substitution. Such items (if any) are described in Document 00 1113 (Notice Inviting Bids).

6.09 Definitions:

A. All abbreviations and definitions of terms used in this Document 00 2113 are set forth in Document 00 7200 (General Conditions) and Section 01 4200 (References and Definitions).

END OF DOCUMENT

DOCUMENT 00 3132

GEOTECHNICAL DATA AND EXISTING CONDITIONS

ARTICLE 1 REPORTS AND INFORMATION ON EXISTING CONDITIONS

1.01 Inspection of Reports:

A. Owner, its consultants, and prior contractors may have collected documents providing a general description of the Site and conditions of the Work. These documents may consist of geotechnical reports for and around the Site, contracts, contract specifications, tenant improvement contracts, as-built drawings, utility drawings, information regarding Underground Facilities, and hazardous material surveys or information (collectively, **Existing Conditions Data**.)

B. Bidders may inspect Geotechnical and Existing Conditions Data. These documents are listed in Section 01 1100 (Summary of Work) and are available for review at the address identified therein. Copies may be obtained for the cost of reproduction and handling upon Bidder's payment for the costs.

C. Existing Conditions Data is for information only and does not describe labor, materials or equipment furnished by Contractor, but rather, information regarding conditions of the work. Such Existing Conditions Data is not a Contract Document.

ARTICLE 2 USE OF EXISTING CONDITIONS DATA

2.01 Above-Ground Existing Conditions:

A. Owner makes no warranty or representation of existing aboveground conditions, as-built conditions, or other aboveground actual conditions verifiable by reasonable independent investigation. These conditions are verifiable by Bidder by the performance of its own independent investigation that Bidder must perform prior to bidding and Bidder must not rely on the information supplied by Owner regarding existing conditions.

B. Bidder represents and agrees that in submitting its Bid, it is not relying on any information regarding above-ground existing conditions supplied by Owner.

2.02 Underground Facilities:

A. Information supplied regarding existing Underground Facilities at or contiguous to the Site is based on information furnished to Owner by others (e.g., the builders of such Underground Facilities or others).

B. Owner assumes responsibility for only the general accuracy, completeness or thoroughness of information regarding Underground Facilities that are owned by Owner. This express assumption of responsibility applies only if Bidder has conducted the independent investigation required of it under Document 00 7200 (General Conditions) and discrepancies were not apparent. Bidder is solely responsible for any interpretation or conclusion drawn from this information. Owner is not responsible for information regarding Underground Facilities that are owned by others.

2.03 Hazardous Materials Surveys:

A. Bidders may rely on this data and information for general accuracy regarding the locations of potentially hazardous materials subject of the Work. Owner does not warrant and makes no representation regarding the completeness or thoroughness of any data or information regarding existing conditions or hazardous materials including, but not limited to, quantities, characteristics, volumes, or associated structural features. Bidder represents and agrees that in submitting a Bid it is not relying on any such data, information or deductions.

B. Data and information regarding the locations of hazardous materials are not part of Contract Documents.

2.04 Geotechnical Data:

A. Bidder may rely upon the general accuracy of the "technical data" contained in the geotechnical reports and drawings identified above, but only insofar as it relates to subsurface conditions, provided Bidder has conducted the independent investigation required of it and discrepancies were not apparent.

B. The term **"technical data"** shall include actual reported depths, reported quantities, reported soil types, reported soil conditions, and reported material, equipment, or structures that were encountered during subsurface exploration. The term "technical data" does not include, and Bidder may not rely upon, any other data, interpretations, opinions or information shown or indicated in such drawings or reports that otherwise relate to subsurface conditions or described structures. The term "technical data" shall not include the location of Underground Facilities.

C. Bidder may not rely on the completeness of reports and drawings for the purposes of bidding or construction. Bidder is solely responsible for any interpretation or conclusion drawn from any "technical data" or any other data, interpretations, opinions, or information contained in supplied geotechnical data.

2.05 Except as expressly set forth in this Document 00 3132, Owner does not warrant, and makes no representation regarding, the accuracy or thoroughness of any geotechnical data.

A. Bidder represents and agrees that in submitting its Bid, it is not relying on any geotechnical data supplied by Owner, except as specifically set forth herein.

ARTICLE 3 INVESTIGATIONS

3.01 Required Investigations:

A. Before submitting a Bid, each Bidder shall be responsible to obtain such additional or supplementary examinations, investigations, explorations, tests, studies and data concerning conditions (surface, subsurface, and Underground Facilities) at or contiguous to the Site or otherwise, which may affect cost, progress, performance or furnishing of Work or which relate to any aspect of the means, methods, techniques, sequences or procedures of construction to be employed by Bidder and safety precautions and programs incident thereto or which Bidder deems necessary to determine its Bid for performing and furnishing the Work in accordance with the time, price and other terms and conditions of Contract Documents.

B. Bidders shall advise Owner in writing during the Bid period of any questions, suppositions, inferences or deductions Bidders may have for Owner's review and response.

C. Owner has provided time in the period prior to bidding for Bidder to perform these investigations.

3.02 Access to Site for Investigations:

A. During the Pre-Bid Site Visit(s), Owner will provide each Bidder access to the Site to conduct such examinations, investigations, explorations, tests, and studies, as each Bidder deems necessary for submission of a Bid, provided that invasive testing will be permitted only to the extent provided in Document 00 2113 (Instructions to Bidders), and provided that each Bidder seeking access to conduct such investigations provides Document 00 2100 (Access, Indemnity and Release Agreement). Bidders must fill all holes and clean up and restore the Site to its former conditions upon completion of such explorations, investigations, tests, and studies. Such investigations may be performed only under the provisions of Document 00 2113 (Instructions to Bidders) and Document 00 7200 (General Conditions) including, but not limited to, proof of insurance and obligation to indemnify against claims arising from such investigation work. Each Bidder shall supply all equipment required to perform any investigations as each Bidder deems necessary. Owner has the right to limit the number of pieces of machinery operating at any one time due to safety concerns or in order to protect or maintain the Site from potential damage or interruption to general operational activities.

END OF DOCUMENT

DOCUMENT 00 4113

BID FORM

TO THE COASTSIDE FIRE PROTECTION DISTRICT

THIS BID IS SUBMITTED BY:

_____
(Firm/Company Name)

Re: Fire Station #44 Replacement Project at 501 Stetson Street, Moss Beach, CA 94038

1. The undersigned Bidder proposes and agrees, if this Bid is accepted, to enter into an agreement with the **COASTSIDE FIRE PROTECTION DISTRICT** in the form included in the Contract Documents, Document 00 5200 (Agreement), to perform and furnish all Work as specified or indicated in the Contract Documents for the Contract Sum and within the Contract Time indicated in this Bid and in accordance with all other terms and conditions of the Contract Documents.

2. Bidder accepts all of the terms and conditions of the Contract Documents, Document 00 1113 (Notice Inviting Bids), and Document 00 2113 (Instructions to Bidders) including, without limitation, those dealing with the disposition of Bid Security. This Bid will remain subject to acceptance for 60 Days after the day of Bid opening, unless there is a bid protest, then 90 days after the day of bid opening.

3. In submitting this Bid, Bidder represents that Bidder has examined all of the Contract Documents, performed all necessary Pre-Bid investigations, attended the mandatory Pre-Bid Meeting, received the Pre-Bid Meeting minutes (if any), and received the following Addenda:

Addendum Number	**Addendum Date**	**Signature of Bidder**

4. Based on the foregoing, Bidder proposes and agrees to fully perform the Work within the time stated and in strict accordance with the Contract Documents for the following sums of money listed in the following Schedule of Bid Prices:

SCHEDULE OF BID PRICES

All Bid items, including lump sums, unit prices and alternates (if any), must be filled in completely. Bid items are described in Section 01 1100 (Summary of Work). Quote in figures only, unless words are specifically requested.

ITEM	DESCRIPTION	EST. QTY.	UNIT	TOTAL
A	**Site Work & Retaining Wall**			
A1	General Conditions	1	LS	
A2	Site Demolition	1	LS	
A3	Earthwork and Grading	1	LS	
A4	AC Paving and Parking	1	LS	
A5	Site Concrete	1	LS	
A6	Site Metals	1	LS	
A7	Landscaping & Irrigation	1	LS	
A8	Fences & Gates	1	LS	
A9	Site Furnishings	1	LS	
A10	Site Structures	1	LS	
A11	Storm Drainage	1	LS	
A12	Water Distribution	1	LS	
A13	Sanitary Sewage	1	LS	
A14	Gas Distribution	1	LS	
A15	Site Electrical	1	LS	
	TOTAL A - Site Work & Retaining Wall			
B	**Fire Station 44 Building**			
B1	General Conditions	1	LS	
B2	Concrete	1	LS	
B3	Masonry	1	LS	
B4	Metals	1	LS	
B5	Rough Carpentry	1	LS	
B6	Finish Carpentry	1	LS	
B7	Thermal & Moisture Protection	1	LS	
B8	Openings	1	LS	
B9	Finishes	1	LS	
B10	Specialties	1	LS	
B11	Equipment	1	LS	
B12	Conveying	1	LS	

B13	Fire Suppression	1	LS	
B14	Plumbing	1	LS	
B15	Mechanical	1	LS	
B16	Electrical	1	LS	
B17	Communications	1	LS	
B18	Electronic Safety & Security	1	LS	
TOTAL B - Fire Station 44 Building				
TOTAL BID PRICE (TOTAL A + TOTAL B)				

Total Bid Price:

_____

(Indicate Bid Price in Words)

5. The undersigned acknowledges that the Apparent Low Bidder will be determined as provided in Documents 00 1113 (Notice to Bidders) and Document 00 2113 (Instruction to Bidders).

6. Subcontractors for work are listed on Document 00 4330 (Subcontractors List), submitted herewith.

7. The undersigned Bidder understands that Owner reserves the right to reject this Bid.

8. If written notice of the acceptance of this Bid, hereinafter referred to as Notice of Award, is mailed or delivered to the undersigned Bidder within the time described in Paragraph 2 of this Document 00 4113 or at any other time thereafter before it is withdrawn, the undersigned Bidder will execute and deliver the documents required by Document 00 2113 (Instructions to Bidders) within the times specified therein.

9. Notice of Award or request for additional information may be addressed to the undersigned Bidder at the address set forth below.

10. The undersigned Bidder herewith encloses cash, a cashier's check, or certified check of or on a responsible bank in the United States, or a corporate surety bond furnished by a surety authorized to do a surety business in the State of California, in form specified in Document 00 2113 (Instructions to Bidders), in the amount of ten percent (10%) of the Total Bid Price and made payable to the **COASTSIDE FIRE PROTECTION DISTRICT**.

11. The undersigned Bidder agrees to commence Work under the Contract Documents on the date established in Document 00 7200 (General Conditions) and to complete all Work within the time specified in Document 00 5200 (Agreement).

12. The undersigned Bidder agrees that, in accordance with Document 00 7200 (General Conditions), liquidated damages for failure to complete all Work in the Contract within the time specified in Document 00 5200 (Agreement) shall be as set forth in Document 00 5200.

13. The names of all persons interested in the foregoing Bid as principals are:

IMPORTANT NOTICE: If Bidder or other interested person is a corporation, give the legal name of corporation, state where incorporated, and names of president and secretary thereof; if a partnership, give name of the firm and names of all

individual co-partners composing the firm; if Bidder or other interested person is an individual, give first and last names in full.

NAME OF BIDDER: _____

licensed in accordance with an act for the registration of Contractors, and with license number:_____ Expiration: _____.

_____
(Place of Incorporation, if Applicable) (Principal)

_____
(Principal)

_____
(Principal)

I certify (or declare) under penalty of perjury under the laws of the State of California that the foregoing is true and correct.

_____
(Signature of Bidder)

NOTE: If Bidder is a corporation, set forth the legal name of the corporation together with the signature of the officer or officers authorized to sign contracts on behalf of the corporation. If Bidder is a partnership, set forth the name of the firm together with the signature of the partner or partners authorized to sign contracts on behalf of the partnership.

Business Address: _____

_____

_____

Contractor's Representative(s): _____
(Name/Title)

_____
(Name/Title)

_____
(Name/Title)

Officers Authorized to Sign Contracts _____
(Name/Title)

_____
(Name/Title)

_____

(Name/Title)

Telephone Number(s): _____
(Area Code) (Number)

_____
(Area Code) (Number)

Fax Number(s): _____
(Area Code) (Number)

_____
(Area Code) (Number)

Email: _____

Date of Bid: _____

END OF DOCUMENT

DOCUMENT 00 4313

BOND ACCOMPANYING BID

KNOW ALL BY THESE PRESENTS:

That the undersigned

_____,
(Name of Contractor)

as Principal and the undersigned as Surety are held and firmly bound unto Owner, **COASTSIDE FIRE PROTECTION DISTRICT,** a special district of the State of California, as obligee, in the penal sum of **(Dollar Amount In Words)**_____ Dollars **($_____)** lawful money of the United States of America being at least ten percent (10%) of the aggregate amount of said Principal's base Bid, for the payment of which, well and truly to be made, we bind ourselves, our successors, executors, administrators, and assigns, jointly and severally, firmly by these presents.

WHEREAS, said Principal is submitting a Bid for Owner **Fire Station #44 Replacement Project** at **501 Stetson Street, Moss Beach, CA 94038**

THE CONDITION OF THIS OBLIGATION IS SUCH that if the Bid submitted by the said Principal be accepted and the Contract be awarded to said Principal and said Principal shall within the required periods enter into the Contract so awarded and provide the required Construction Performance Bond, Construction Labor and Material Payment Bond, insurance certificates, Guaranty, and all other endorsements, forms, and documents required under Document 00 2113 (Instructions to Bidders), then this obligation shall be void, otherwise to remain in full force and effect.

IN WITNESS WHEREOF, the above bounden parties have executed this instrument this _____ day of _____, 20___.
(Month)

(Corporate Seal) By _____
Principal

By _____
Surety

(Corporate Seal) By _____
Attorney in Fact

END OF DOCUMENT

DOCUMENT 00 4314

BIDDER REGISTRATION FORM

INDEPENDENT CONTRACTOR REGISTRATION

Contractor's License # _____

Date: _____ Fed I.D. # _____

Full Corporate Name of Company: _____

Street Address: _____

_____

Mailing Address: _____

_____

Phone: _____ Fax: _____

Name of Principal Contact: _____

Type of Business: _____ Sole Proprietor _____ Partnership
_____ Non-Profit 501(c)(3) _____ Corporation
_____ other (please explain:_____)

INSURANCE

Workers' Compensation:

Carrier: _____

Address: _____

Phone and Fax: _____

Policy Number: _____

General Liability:

Carrier: _____

Address: _____

Phone and Fax: _____

Policy Number: _____

Policy Limits: $ _____

A.M. Best Rating: _____

Automobile Liability:

Carrier: _____

Address: _____

Phone and Fax: _____

Policy Number: _____

Policy Limits: $ _____

A.M. Best Rating: _____

All-risk Course of Construction (as required by Document 00 7316 – Insurance and Indemnification):

Carrier: _____

Address: _____

Phone and Fax: _____

Policy Number: _____

Policy Limits: $ _____

A.M. Best Rating: _____

Professional Liability (if applicable, as required by Document 00 7316 – Insurance and Indemnification):

Carrier: _____

Address: _____

Phone and Fax: _____

Policy Number: _____

Policy Limits: $ _____

A.M. Best Rating: _____

Pollution Legal Liability Insurance (if applicable, as required by Document 00 7316 – Insurance and Indemnification):

Carrier: _____

Address: _____

Phone and Fax: _____

Policy Number: _____

Policy Limits: $ _____

A.M. Best Rating: _____

BIDDER CERTIFIES, UNDER PENALTY OF PERJURY, THAT THE FOREGOING INFORMATION IS CURRENT AND ACCURATE AND AUTHORIZES OWNER, AND ITS AGENTS AND REPRESENTATIVES TO OBTAIN A CREDIT REPORT AND/OR VERIFY ANY OF THE ABOVE INFORMATION.

_____
SIGNATURE

_____
DATE

SAFETY EXPERIENCE

The following statements as to the Bidder's safety experience are submitted with the Bid, as part thereof, and the Bidder guarantees the truthfulness and accuracy of all information.

1. List Bidder's interstate Experience Modification Rate for the last three years.

   [20__] _____ **[20__]** _____ **[20__]** _____

2. Use Bidder's last year's Cal/OSHA 201 log to fill in the following number of injuries and illnesses:

   a. Number of lost workday cases _____

   b. Number of medical treatment cases _____

   c. Number of fatalities _____

3. Employee hours worked last year _____

4. State the name of Bidder's safety engineer/manager:

Attach a resume or outline of this individual's safety and health qualifications and experience.

I CERTIFY, UNDER PENALTY OF PERJURY, THAT THE FOREGOING INFORMATION IS CURRENT AND ACCURATE AND I AUTHORIZE OWNER, AND ITS AGENTS AND REPRESENTATIVES TO OBTAIN A CREDIT REPORT AND/OR VERIFY ANY OF THE ABOVE INFORMATION.

BIDDER:

By: _____
Signature

Its: _____
Title

Date_____

END OF DOCUMENT

DOCUMENT 00 4330

SUBCONTRACTORS LIST

The Subcontractors List must include the names of all subcontractors for those subcontractors who will perform any portion of Work, including labor, rendering of service, or specially fabricating and installing a portion of the Work or improvement according to detailed drawings contained in the plans and specifications, in excess of one half of one percent (0.5%) of the total Bid amount.

Name of Subcontractor and Location of Place of Business	Description of Work	Subcontractor's License No.	DIR Registration Number*

(Bidder to attach additional sheets if necessary)

* Pursuant to Division 2, Part 7, Chapter 1 (commencing with section 1720) of the California Labor Code.

END OF DOCUMENT

DOCUMENT 00 4519

NON-COLLUSION AFFIDAVIT

PUBLIC CONTRACT CODE §7106

NON-COLLUSION AFFIDAVIT TO BE EXECUTED BY BIDDER AND SUBMITTED WITH BID

(THIS AFFIDAVIT MUST BE NOTARIZED)

STATE OF CALIFORNIA)
) ss.
COUNTY OF _____)

_____, being first duly sworn,
(Name of Principal of Bidder)

deposes and says that he or she is _____
(Office of Affiant)

of _____, the party
(Name of Bidder)

making the foregoing Bid, that the Bid is not made in the interest of, or on behalf of, any undisclosed person, partnership, company, association, organization, or corporation; that the Bid is genuine and not collusive or sham; that Bidder has not directly or indirectly induced or solicited any other bidder to put in a false or sham Bid, and has not directly or indirectly colluded, conspired, connived or agreed with any bidder or anyone else to put in a sham Bid, or that anyone shall refrain from bidding, and that the Bidder has not in any manner, directly or indirectly, sought by agreement, communication or conference with anyone to fix the Bid price of Bidder or any other bidder, or to fix any overhead, profit or cost element of the Bid price, or of that of any other bidder, or to secure any advantage against Owner, or anyone interested in the proposed contract; that all statements contained in the Bid are true; and further, that Bidder has not, directly or indirectly, submitted its Bid price or any breakdown thereof, or the contents thereof, or divulged information or data relative thereto, or paid, and will not pay, any fee to any corporation, partnership, company association, organization, Bid depository, or to any member or agent thereof to effectuate a collusive or sham Bid.

Executed under penalty of perjury under the laws of the State of California:

_____
(Name of Bidder)

_____
(Signature of Principal)

Subscribed and sworn before me _____

This _____ day of _____, 20__

Notary Public of the State of _____

In and for the County of_____

My Commission expires_____ (Seal)

NOTE: If Bidder is a partnership or a joint venture, this affidavit must be signed and sworn to by every member of the partnership or venture.

NOTE: If Bidder [including any partner or venturer of a partnership or joint venture] is a corporation, this affidavit must be signed by the Chairman, President, or Vice President and by the Secretary, Assistant Secretary, Chief Financial Officer, or Assistant Treasurer.

NOTE: If Bidder's affidavit on this form is made outside the State of California, the official position of the person taking such affidavit shall be certified according to law.

END OF DOCUMENT

DOCUMENT 00 4546

BIDDER CERTIFICATIONS

TO BE EXECUTED BY ALL BIDDERS AND SUBMITTED WITH BID

The undersigned Bidder certifies to Owner as set forth in sections 1 through 7 below.

1. STATEMENT OF CONVICTIONS

By my signature hereunder, I hereby swear, under penalty of perjury, that no more than one final, unappealable finding of contempt of court by a Federal Court has been issued against Bidder within the past two years because of failure to comply with an order of a Federal Court or to comply with an order of the National Labor Relations Board.

2. CERTIFICATION OF WORKER'S COMPENSATION INSURANCE

By my signature hereunder, as the Contractor, I certify that I am aware of the provisions of Labor Code Section 3700 that require every employer to be insured against liability for worker's compensation or to undertake self-insurance in accordance with the provisions of that Code, and I will comply with such provisions before commencing the performance of the work of this Contract.

3. CERTIFICATION OF PREVAILING WAGE RATES AND RECORDS

By my signature hereunder, as the Contractor, I certify that I am aware of the provisions of Labor Code Section 1773 that requires the payment of prevailing wage on public projects. Contractor and any subcontractors under the Contractor shall comply with Labor Code Section 1776 regarding wage records, and with Labor Code Section 1777.5 regarding the employment and training of apprentices. Contractor is responsible to ensure compliance by any and all subcontractors performing work under this Contract.

4. CERTIFICATION OF COMPLIANCE WITH PUBLIC WORKS CHAPTER OF LABOR CODE

By my signature hereunder, as the Contractor, I certify that I am aware of Labor Code Sections 1777.1 and 1777.7 and Contractor and Subcontractors are eligible to bid and work on public works projects.

5. CERTIFICATION OF NON-DISCRIMINATION

By my signature hereunder, as the Contractor, I certify that there will be no discrimination in employment with regard to race, color, religion, gender, sexual orientation, age or national origin; that all federal, state, and local directives and executive orders regarding non-discrimination in employment will be complied with; and that the principal of equal opportunity in employment will be demonstrated positively and aggressively.

6. CERTIFICATION OF NON-DISQUALIFICATION

By my signature hereunder, as the Contractor, I swear, under penalty of perjury, that the below indicated Bidder, any officer of Bidder, or any employee of Bidder who has a proprietary interest in such Bidder, has never been disqualified, removed, or otherwise prevented from bidding on, or completing a Federal, State, or local government project because of a violation of law or safety regulation, except as indicated on the separate sheet attached hereto entitled "Previous Disqualifications." If a statement of "Previous Disqualifications" is attached, please explain the circumstances.

7. CERTIFICATION OF ADEQUACY OF CONTRACT AMOUNT

By my signature hereunder, as the Contractor, pursuant to Labor Code Section 2810(a), I certify that, if awarded the Contract based on the undersigned's Bid, the Contract will include funds sufficient to allow the Contractor to comply with all applicable local, state, and federal laws or regulations governing the labor or services to be provided. I understand that Owner will be relying on this certification if it awards the Contract to the undersigned.

BIDDER: _____
(Name of Bidder)

Date: _____, **[202]** By:_____
(Signature)

Name:_____
(Print Name)

Its:_____
(Title)

END OF DOCUMENT

DOCUMENT 00 5050

NOTICE OF INTENT TO AWARD FOR CONSTRUCTION

DATE POSTED:

PROJECT TITLE: **COASTSIDE FIRE PROTECTION DISTRICT**
Fire Station #44 Replacement Project
501 Stetson Street, Moss Beach, CA 94038

_____, the _____ of

Owner intends to recommend to its **Board of Directors** the Award of the above-referenced Project to

_____.

(Name of Contractor)

OWNER: COASTSIDE FIRE PROTECTION DISTRICT

By: _____

_____
(Print name)

Title: _____

Date: _____

END OF DOCUMENT

DOCUMENT 00 5100

NOTICE OF AWARD

Dated _____

TO: _____

ADDRESS: _____

CONTRACT NO.: _____

CONTRACT FOR: **COASTSIDE FIRE PROTECTION DISTRICT**
Fire Station #44 Replacement Project
501 Stetson Street, Moss Beach, CA 94038

The Contract Sum of your contract is _____
(Amount in Words)

Dollars ($_____)

1. Five copies of the proposed Contract Documents listed below accompany this Notice of Award.

2. You must comply with the following conditions precedent by **[5:00 p.m.]** of the **[20th Day]** following the date of this Notice of Award, that is, by **[Day of the Week, Month Day, 20__]**.

   a. Deliver to Owner **two** fully executed counterparts of Document 00 5200 (Agreement). Each copy of Document 00 5200 (Agreement) must bear your original signature on the signature page and your initials on each page.

   b. Deliver to Owner three originals of Document 00 6113.13 (Construction Performance Bond), executed by you and your surety.

   c. Deliver to Owner three originals of Document 00 6113.16 (Construction Labor and Material Payment Bond), executed by you and your surety.

   d. Deliver to Owner original set of the insurance certificates with endorsements required under Document 00 7316 (Supplementary Conditions – Insurance).

   e. Deliver to Owner one fully executed Document 00 6536 (Guaranty), bearing your original signature on the signature page and your initials on each page.

3. Failure to comply with these conditions within the time specified will entitle Owner to consider your Bid abandoned, to annul this Notice of Award, and to declare your Bid security forfeited.

4. Within **[21 Days]** after you comply with the conditions in Paragraph 2 of this Document 00 5100, Owner will return to you one fully signed counterpart of Document 00 5200 (Agreement).

5. Before you may start any Work at the Site, you must attend a pre-construction conference. The pre-construction conference may be arranged through **Sean Rose,, sean@srroseengineering.com, (650) 400-1462.** Questions regarding bonds and insurance may be directed to **Kai Ruess, kruess@adcl.com, (650) 533-2149**. All other inquiries regarding the Project should be directed to **Sean Rose, sean@srroseengineering.com, (650) 400-1462.**

6. Upon commencement of the Work, you and each of your Subcontractors shall certify and provide Owner copies of payroll records in accordance with Labor Code Section 1776.

OWNER: COASTSIDE FIRE PROTECTION DISTRICT

By: _____
(Signature)

_____
(Print Name)

_____
(Title)

ATTEST: _____
Secretary

_____
(Print Name)

AUTHORIZED BY DISTRICT RESOLUTION:

NO: _____

ADOPTED: _____, **[20__]**

[Copy of Resolution Attached]

END OF DOCUMENT

DOCUMENT 00 5200

AGREEMENT

THIS AGREEMENT, dated this **[date]** day of **[Month], [20__]**, by and between **[Enter Name of Contractor]** whose place of business is located at **[Address of Contractor**] (**Contractor**), and **COASTSIDE FIRE PROTECTION DISTRICT**, a special district of the State of California, (**Owner**), acting under and by virtue of the authority vested in Owner by the laws of the State of California.

WHEREAS, Owner, by its Resolution No. **[Insert Number]** adopted on the **[date] day of [Month, Year]** awarded to Contractor the following Contract:

Fire Station #44 Replacement Project
501 Stetson Street, Moss Beach, CA 94038

NOW, THEREFORE, in consideration of the mutual covenants hereinafter set forth, Contractor and Owner agree as follows:

ARTICLE 1 SCOPE OF WORK OF THE CONTRACT

1.01 Work of the Contract:

A. Contractor shall complete all Work specified in the Contract Documents, in accordance with the Specifications, Drawings, and all other terms and conditions of the Contract Documents (**Work**).

1.02 Price for Completion of the Work:

A. Owner shall pay Contractor the following Contract Sum (**Contract Sum**) for completion of Work in accordance with Contract Documents as set forth in Contractor's Bid, attached hereto.

B. The Contract Sum includes all allowances (if any).

[ATTACH COPY OF BID]

14. **COMMENCEMENT AND COMPLETION OF WORK**

1.03 Commencement of Work:

Contractor shall commence Work on the date established in the Notice to Proceed (**Commencement Date**).

A. Owner reserves the right to modify or alter the Commencement Date.

Completion of Work:

B. Contractor shall achieve Substantial Completion of the entire Work within **500 Calendar Days** from the Commencement Date.

C. Contractor shall achieve Final Completion of the entire Work within five hundred **545 Calendar Days** from the Commencement Date.

ARTICLE 2 PROJECT REPRESENTATIVES

2.01 Owner's Project Manager:

A. Owner shall designate a Project Manager to act as Owner's Representative in all matters relating to the Contract Documents. If Project Manager is an employee of Owner, Project Manager is the beneficiary of all Contractor obligations to Owner including, without limitation, all releases and indemnities.

B. Project Manager shall have final authority over all matters pertaining to the Contract Documents and shall have sole authority to modify the Contract Documents on behalf of Owner, to accept work,

and to make decisions or actions binding on Owner, and shall have sole signature authority on behalf of Owner.

C. Owner may assign all or part of the Project Manager's rights, responsibilities and duties to a Construction Manager, or other Owner Representative.

2.02 Contractor's Project Manager and Other Key Personnel:

A. Contractor has designated **[_____]** as its Project Manager to act as Contractor's Representative in all matters relating to the Contract Documents.

B. Contractor has designated the following other Key Personnel for the Project:

Name	Position
_____	Superintendent ***[See Doc. 00 7200 Para. 8.01.B]***
_____	_____
_____	_____

2.03 Architect/Engineer:

A. **[Identify Architect/Engineer]** furnished the Plans and Specifications and shall have the rights assigned to Architect/Engineer in the Contract Documents.

B. Architect/Engineer has designated **Austin Duncklee, PBK Architects Inc.,** as its project manager, to act as its representative for receiving and making communications authorized under the Contract Documents.

ARTICLE 3 LIQUIDATED DAMAGES FOR DELAY IN COMPLETION OF WORK

3.01 Liquidated Damage Amounts:

A. As liquidated damages for delay Contractor shall pay Owner Thousand dollars ($1,000.00) for each Day that expires after the time specified herein for Contractor to achieve Substantial Completion of the entire Work, until achieved.

B. As liquidated damages for delay Contractor shall pay Owner Thousand dollars ($1,000.00) for each Day that expires after the time specified herein for Contractor to achieve Final Completion of the entire Work, until achieved.

3.02 Scope of Liquidated Damages:

A. Measures of liquidated damages shall apply cumulatively.

B. Limitations and stipulations regarding liquidated damages are set forth in Document 00 7200 (General Conditions).

ARTICLE 4 LIQUIDATED DAMAGES FOR UNAUTHORIZED CHANGES OF KEY PERSONNEL

4.01 Liquidated Damage Amounts:

A. See Document 00 7200 (General Conditions) Paragraph 11.07.D for liquidated damages provisions pertaining to Key Personnel.

ARTICLE 5 CONTRACT DOCUMENTS

5.01 Contract Documents consist of the following documents, including all changes, Addenda, and Modifications thereto:

Document 00 5100	Notice of Award
Document 00 5200	Agreement
Document 00 5500	Notice to Proceed
Document 00 6113.13	Construction Performance Bond
Document 00 6113.16	Construction Labor and Material Payment Bond

Document 00 6290	Escrow Agreement for Security Deposits
Document 00 6325	Substitution Request Form
Document 00 6530	Release of Claims
Document 00 6536	Guaranty
Document 00 7200	General Conditions
Document 00 7316	Supplementary Conditions – Insurance and Indemnification
Document 00 7380	Apprenticeship Program
Document 00 9113	Addenda

General Requirements

Document 01 1100	Summary
Document 01 2000	Measurement and Payment
Document 01 2600	Modification Procedures
Document 01 3119	Project Meetings
Document 01 3200	Progress Schedules and Reports
Document 01 3300	Submittals
Document 01 4100	Regulatory Requirements
Document 01 4200	References and Definitions
Document 01 7700	Contract Closeout

Technical Specifications
Project Plans

5.02 There are no Contract Documents other than those listed above. The Contract Documents may only be amended, modified or supplemented as provided in Document 00 7200 (General Conditions).

ARTICLE 6 MISCELLANEOUS

6.01 Terms and abbreviations used in this Agreement are defined in Document 00 7200 (General Conditions) and Section 01 4200 (References and Definitions) and will have the meaning indicated therein.

6.02 It is understood and agreed that in no instance are the persons signing this Agreement for or on behalf of Owner or acting as an employee, agent, or representative of Owner, liable on this Agreement or any of the Contract Documents, or upon any warranty of authority, or otherwise, and it is further understood and agreed that liability of Owner is limited and confined to such liability as authorized or imposed by the Contract Documents or applicable law.

6.03 Pursuant to Labor Code Section 1771(a), Contractor represents that it and all of its Subcontractors are currently registered and qualified to perform public work pursuant to Labor Code Section 1725.5. Contractor covenants that any additional or substitute Subcontractors will be similarly registered and qualified.

6.04 In entering into a public works contract or a subcontract to supply goods, services or materials pursuant to a public works contract, Contractor or Subcontractor offers and agrees to assign to the awarding body all rights, title and interest in and to all causes of action it may have under Section 4 of the Clayton Act (15 U.S.C. §15) or under the Cartwright Act (Chapter 2 (commencing with §16700) of Part 2 of Division 7 of the Business and Professions Code), arising from purchases of goods, services or materials pursuant to the public works contract or the subcontract. This assignment shall be made and become effective at the time Owner tenders final payment to Contractor, without further acknowledgment by the parties.

6.05 Copies of the general prevailing rates of per diem wages for each craft, classification, or type of worker needed to execute the Contract, as determined by Director of the State of California Department of Industrial Relations, may be obtained from the California Department of Industrial Relations website [http://www.dir.ca.gov/OPRL/DPreWageDetermination.htm] and are deemed

included in the Contract Documents, and shall be made available to any interested party on request. Pursuant to Labor Code Sections 1860 and 1861, in accordance with Labor Code Section 3700, every contractor will be required to secure the payment of compensation to his employees. Contractor represents that it is aware of the provisions of Labor Code Section 3700 that require every employer to be insured against liability for workers' compensation or to undertake self-insurance in accordance with the provisions of that Code, and Contractor shall comply with such provisions before commencing the performance of the Work of the Contract Documents.

6.06 This Agreement and the Contract Documents shall be deemed to have been entered into in the County in which the Project is located, State of California, and governed in all respects by California law (excluding choice of law rules). The exclusive venue for all disputes or litigation hereunder shall be in the Superior Court for the in which the Project is located.

IN WITNESS WHEREOF the parties have executed this Agreement in quadruplicate the day and year first above written.

CONTRACTOR: {CONTRACTOR'S NAME]

By: _____
(Signature)

Its: _____
Title (If Corporation: Chairman, President or Vice President)

By: _____
(Signature)

Its: _____
Title (If Corporation: Secretary, Assistant Secretary, Chief Financial Officer or Assistant Treasurer)

OWNER: **COASTSIDE FIRE PROTECTION DISTRICT**

By:_____
(Signature)

_____
(Print Name)

_____
(Title)

Attest:_____
Secretary

_____
(Print Name)

APPROVED AS TO FORM AND LEGALITY
THIS __ DAY OF _____, **[20__]**

By:_____
Attorney for Owner

_____

(Print Name)

RESOLUTION NO. _____

END OF DOCUMENT

DOCUMENT 00 5500

NOTICE TO PROCEED

Dated: _____, 20__

To: _____
(Contractor)

Address: _____

_____

CONTRACT FOR: **COASTSIDE FIRE PROTECTION DISTRICT**

Fire Station #44 Replacement Project
501 Stetson Street, Moss Beach, CA 94038

You are notified that the Contract Time under the above Contract will commence to run on _____ **[20__]**. On that date, you are to start performing your obligations with respect to Work at the Site under the Contract Documents. In accordance with Article 2 of Document 00 5200 (Agreement), the dates of Substantial Completion and Final Completion for the entire Work are _____,**[20__]** and _____, **[20__]**, respectively.

Before you may start any Work at the Site, you must:

1. Submit certified Safety Program and related information
2. Submit copies of applicable permits
3. **[Other]**

15. **OWNER: COASTSIDE FIRE PROTECTION DISTRICT**

By: _____

Its: _____

END OF DOCUMENT

DOCUMENT 00 6113.13

CONSTRUCTION PERFORMANCE BOND

THIS CONSTRUCTION PERFORMANCE BOND (**Bond**) is dated ***[Month, Day]***, 20_ is in the amount of ***[_____Insert Amount_____]*** (**Penal Sum**),which is 100% of the Contract Sum and is entered into by and between the parties listed below to ensure the faithful performance of the Contract identified below. This Bond consists of this page and the Bond Terms and Conditions, Paragraphs 1 through 14 attached to this page. Any singular reference to ***[Insert name of Contractor]*** (**Contractor**), ***[Insert name of Surety]*** (**Surety**), Coastside Fire Protection District (**Owner**), or other party shall be considered plural where applicable.

CONTRACTOR:	**SURETY:**
[Insert name of Contractor]	***[Insert name of Surety]***
_____	_____
Address	Principal Place of Business
_____	_____
City/State/Zip	City/State/Zip

CONSTRUCTION CONTRACT: Agreement for the ***Fire Station #44 Replacement Project*** located at the 501 Stetson Street, Moss Beach, California, dated ***[Month, Day]***, 20_, in the amount of ***[_____Insert Amount***

CONTRACTOR AS PRINCIPAL	**SURETY**
Company: (Corp. Seal)	Company: (Corp. Seal)
Signature:_____	Signature: _____
Name: _____	Name: _____
Title: _____	Title: _____

BOND TERMS AND CONDITIONS

1. Contractor and Surety, jointly and severally, bind themselves, their heirs, executors, administrators, successors and assigns to Owner and the State of California for the complete and proper performance of the Construction Contract, which is incorporated herein by reference.

2. If Contractor completely and properly performs all of its obligations under the Construction Contract, Surety and Contractor shall have no obligation under this Bond.

3. If there is no Owner Default, Surety's obligation under this Bond shall arise after:

3.1 Owner provides Surety with written notice that Owner has declared a Contractor Default under the Construction Contract pursuant to the terms of the Construction Contract; and

3.2 Owner has agreed to pay the Balance of the Contract Sum:

3.2.1 To Surety in accordance with the terms of this Bond and the Construction Contract; or

3.2.2 To a Contractor selected to perform the Construction Contract in accordance with the terms of this Bond and the Construction Contract.

4. When Owner has satisfied the conditions of Paragraph 3 above, Surety shall promptly (within 40 Days) and at Surety's expense elect to take one of the following actions:

4.1 Arrange for Contractor, with consent of Owner, to perform and complete the Construction Contract (but Owner may withhold consent, in which case the Surety must elect an option described in Paragraphs 4.2, 4.3 or 4.4 below); or

4.2 Undertake to perform and complete the Construction Contract itself, through its agents or through independent contractors or Construction entities; provided, that Surety may not select Contractor as its agent or independent contractor or Contractor without Owner's consent; or

4.3 Undertake to perform and complete the Construction Contract by obtaining bids from qualified contractors or Construction entities acceptable to Owner for a contract for performance and completion of the Construction Contract and, upon determination by Owner of the lowest responsive and responsible Bidder, arrange for a contract to be prepared for execution by Owner and the contractor or Contractor selected with Owner's concurrence, to be secured with performance and payment bonds executed by a qualified surety equivalent to the bonds issued on the Construction Contract; and, if Surety's obligations defined in Paragraph 6 below, exceed the Balance of the Contract Sum, then Surety shall pay to Owner the amount of such excess; or

4.4 Waive its right to perform and complete, arrange for completion, or obtain a new contractor or Contractor, and with reasonable promptness under the circumstances and, after investigation and consultation with Owner, determine in good faith its monetary obligation to Owner under Paragraph 6 below, for the performance and completion of the Construction Contract and, as soon as practicable after the amount is determined, tender payment therefor to Owner with full explanation of the payment's calculation. If Owner accepts Surety's tender under this Paragraph 4.4, Owner may still hold Surety liable for future damages then unknown or unliquidated resulting from the Contractor Default, as agreed by Owner and Surety at the time of tender. If Owner disputes the amount of

Surety's tender under this Paragraph 4.4, Owner may exercise all remedies available to it at law to enforce Surety's liability under Paragraphs 6 and 7 below.

5. At all times Owner shall be entitled to enforce any remedy available to Owner at law or under the Construction Contract including, without limitation, and by way of example only, rights to perform work, protect Work, mitigate damages, advance critical Work to mitigate schedule delay, and coordinate Work with other consultants or contractors.

6. If Surety elects to act under Paragraphs 4.1, 4.2 or 4.3, above, within the time period provided in Paragraph 4, above, and complies with its obligations under this Bond, Surety's obligations under this Bond are commensurate with Contractor's Construction Contract obligations. Surety's obligations include, but are not limited to:

6.1 Contractor's obligations to complete the Construction Contract and correct Defective Work;

6.2 Contractor's obligations to pay liquidated damages; and

6.3 To the extent otherwise required of Contractor under the Construction Contract, Contractor's obligations to pay additional legal, design professional, and other costs not included within liquidated damages resulting from Contractor Default (but excluding attorney's fees incurred to enforce this Bond).

7. If Surety does not elect to act under Paragraphs 4.1, 4.2, 4.3, or 4.4, above, within the time period provided in Paragraph 4, above, or comply with its obligations under this Bond, then Surety shall be deemed to be in default on this Bond ten Days after receipt of an additional written notice from Owner to Surety demanding that Surety perform its obligations under this Bond. Such Surety default shall be independent of the Contractor Default. To the extent Surety's independent default causes Owner to suffer damages including, but not limited to, delay damages, which are different from, or in addition to (but not duplicative of) damages which Owner is entitled to receive under the Construction Contract, Surety shall also be liable for such damages. In the event any Surety obligation following its independent default is inconsistent or conflicts with California Civil Code Section 2809, or any other law which either prohibits, restricts, limits or modifies in any way any obligation of a surety which is larger in amount or in any other respect more burdensome than that of the principal, Surety hereby waives the provisions of such laws to that extent.

8. If Surety elects to act under Paragraphs 4.1, 4.3 or 4.4, above, within the time period provided in Paragraph 4, above, and complies with all obligations under this Bond, Surety's monetary obligation under this Bond is limited to the Penal Sum.

9. No right of action shall accrue on this Bond to any person or entity other than Owner or its successors or assigns.

10. Surety hereby waives notice of any change, alteration or addition to the Construction Contract or to related subcontracts, design agreements, purchase orders and other obligations, including changes of time, and of any Owner action in accordance with Paragraph 5 above. Surety consents to all terms of the Construction Contract, including provisions on changes to the Contract. No extension of time, change, alteration, Modification, deletion, or addition to the Contract Documents, or of the Work (including services) required thereunder, or any Owner action in accordance with Paragraph 5 above shall release or exonerate Surety on this Bond or in any way affect the obligations of Surety on this Bond, unless such action is an Owner Default.

11. Any proceeding, legal or equitable, under this Bond shall be instituted in any court of competent jurisdiction where a proceeding is pending between Owner and Contractor regarding the Construction Contract, or in the courts of the County of San Mateo, or in a court of competent jurisdiction in the location in which the Work is located. Communications from Owner to Surety

under Paragraph 3.1 above shall be deemed to include the necessary agreements under Paragraph 3.2 above unless expressly stated otherwise.

12. All notices to Surety or Contractor shall be mailed or delivered (at the address set forth on the signature page of this Bond), and all notices to Owner shall be mailed or delivered as provided in Document 00 5200 (Agreement). Actual receipt of notice by Surety, Owner or Contractor, however accomplished, shall be sufficient compliance as of the date received at the foregoing addresses.

13. Any provision in this Bond conflicting with any statutory or regulatory requirement shall be deemed deleted herefrom and provisions conforming to such statutory requirement shall be deemed incorporated herein.

14. Definitions

14.1 Balance of the Contract Sum: The total amount payable by Owner to Contractor pursuant to the terms of the Construction Contract after all proper adjustments have been made under the Construction Contract, for example, deductions for progress payments made, and increases/decreases for approved Modifications to the Construction Contract**.**

14.2 Construction Contract: The agreement between Owner and Contractor identified on the signature page of this Bond, including all Contract Documents and changes thereto.

14.3 Contractor Default: Material failure of Contractor, which has neither been remedied nor waived, to perform or otherwise to comply with the terms of the Construction Contract, limited to “default” or any other condition allowing a termination for cause as provided in Document 00 7200 (General Conditions).

14.4 Owner Default: Material failure of Owner, which has neither been remedied nor waived, to pay Contractor progress payments due under the Construction Contract or to perform other material terms of the Construction Contract, if such failure is the cause of the asserted Contractor Default and is sufficient to justify Contractor termination of the Construction Contract.

END OF DOCUMENT

DOCUMENT 00 6113.16

CONSTRUCTION LABOR AND MATERIAL PAYMENT BOND

KNOW ALL PERSONS BY THESE PRESENTS:

1.01 THAT WHEREAS, **COASTSIDE FIRE PROTECTION DISTRICT** (**Owner**) has awarded to **(Name of Contractor)** _____ as Principal, Contract Number _____ dated the _____ day of _____, 20___ (the **Contract**), titled Fire Station #44 Replacement Project in the amount of $_____, which Contract is by this reference made a part hereof, for the work of the following Contract:

(**Describe Contract Work): Fire Station #44 Replacement Project per project plans and specifications**

1.02 AND WHEREAS, Principal is required to furnish a bond in connection with the Contract to secure the payment of claims of laborers, mechanics, material suppliers, and other persons as provided by law;

1.03 NOW, THEREFORE, we, the undersigned Principal and **(Name of Surety)** _____ _____ , as Surety, are held and firmly bound unto Owner in the sum of 100% OF THE CONTRACT PRICE **($_____)**, for which payment well and truly to be made we bind ourselves, our heirs, executors, administrators, successors, and assigns, jointly and severally, firmly by these presents.

1.04 THE CONDITION OF THIS OBLIGATION IS SUCH, that if Principal, or its executors, administrators, successors, or assigns approved by Owner, or its subcontractors shall fail to pay any of the persons named in California Civil Code Section 9100, or amounts due under the State of California Unemployment Insurance Code with respect to work or labor performed under the Contract, or for any amounts required to be deducted, withheld, and paid over to the State of California Employment Development Department from the wages of employees of Principal and subcontractors pursuant to Section 13020 of the State of California Unemployment Insurance Code with respect to such work and labor, that Surety will pay for the same in an amount not exceeding the sum specified in this bond, plus reasonable attorneys' fees, otherwise the above obligation shall become and be null and void.

1.05 This bond shall inure to the benefit of any of the persons named in California Civil Code Section 9100, as to give a right of action to such persons or their assigns in any suit brought upon this bond. The intent of this bond is to comply with the California Mechanic's Lien Law.

1.06 Surety, for value received, hereby expressly agrees that no extension of time, change, modification, alteration, or addition to the undertakings, covenants, terms, conditions, and agreements of the Contract, or to the work to be performed thereunder, shall in any way affect the obligation of this bond; and it does hereby waive notice of any such extension of time, change, modification, alteration, or addition to the undertakings, covenants, terms, conditions, and agreements of the Contract, or to the work to be performed thereunder.

1.07 Surety's obligations hereunder are independent of the obligations of any other surety for the payment of claims of laborers, mechanics, material suppliers, and other persons in connection with Contract; and suit may be brought against Surety and such other sureties, jointly and severally, or against any one or more of them, or against less than all of them without impairing Owner's rights against the other.

1.08 Correspondence or claims relating to this bond shall be sent to Surety at the address set forth below.

IN WITNESS WHEREOF, we have hereunto set our hands this _____ day of _____, 20___.

CONTRACTOR AS PRINCIPAL	**SURETY**
Company: (Corp. Seal)	Company: (Corp. Seal)
_____	_____
Signature	Signature
_____	_____
Name	Name
_____	_____
Title	Title
_____	_____
Street Address	Street Address
_____	_____
City, State, Zip Code	City, State, Zip Code

END OF DOCUMENT

DOCUMENT 00 6290

ESCROW AGREEMENT FOR SECURITY DEPOSIT IN LIEU OF RETENTION

California Public Contract Code Section 22300

THIS ESCROW AGREEMENT ("**Escrow Agreement**") is made and entered into this ____ day of _____, 20__, by and between **COASTSIDE FIRE PROTECTION DISTRICT**, ("**Owner**"), whose address is **1191 Main Street, Half Moon Bay, CA 94019**, **(Name of Contractor)** _____ ("**Contractor**"), whose principal place of business is located at **(Contractor's Address)** _____, and **[ ]** Owner, as escrow agent **[OR] [ ] (Name of Bank)** _____, a state or federally chartered bank in the State of California, whose place of business is located at [**Address]** ("**Escrow Agent**").

For the consideration hereinafter set forth, Owner, Contractor and Escrow Agent agree as follows:

1. Pursuant to California Public Contract Code Section 22300, Contractor has the option to deposit securities with Escrow Agent as a substitute for retention earnings required to be withheld by Owner pursuant to Contract entered into between Owner and Contractor for Fire Station #44 Replacement Project located at 501 Stetson Street, Moss Beach, CA 94038 in the amount of $_____ dated _____, 20__ (the "**Contract**"). Alternatively, on written request of Contractor, Owner shall make payments of the retention earnings directly to Escrow Agent. When Contractor deposits the securities as a substitute for Contract earnings, Escrow Agent shall notify Owner within ten Days of the deposit. The market value of the securities at the time of substitution shall be at least equal to the cash amount then required to be withheld as retention under terms of Contract between Owner and Contractor. Securities shall be held in name of _____and shall designate Contractor as the beneficial owner.

2. Owner shall make progress payments to Contractor for those funds which otherwise would be withheld from progress payments pursuant to Contract provisions, provided that Escrow Agent holds securities in form and amount specified in Paragraph 1 of this Document 00 6290.

3. When Owner makes payment(s) of retention earned directly to Escrow Agent, Escrow Agent shall hold said payment(s) for the benefit of Contractor until the time that the escrow created under this Escrow Agreement is terminated. Contractor may direct the investment of the payments into securities. All terms and conditions of this Escrow Agreement and the rights and responsibilities of the parties shall be equally applicable and binding when Owner pays Escrow Agent directly.

4. Contractor shall be responsible for paying all fees for the expenses incurred by Escrow Agent in administering the Escrow Account, and all expenses of Owner. Such expenses and payment terms shall be determined by Owner, Contractor, and Escrow Agent.

5. Interest earned on securities or money market accounts held in escrow and all interest earned on that interest shall be for sole account of Contractor and shall be subject to withdrawal by Contractor at any time and from time to time without notice to Owner.

6. Contractor shall have the right to withdraw all or any part of the principal in the Escrow Account only by written notice to Escrow Agent accompanied by written authorization from Owner to Escrow Agent that Owner consents to withdrawal of amount sought to be withdrawn by Contractor.

7. Owner shall have the right to draw upon the securities in event of default by Contractor. Upon seven Days written notice to Escrow Agent from Owner of the default, Escrow Agent shall immediately convert the securities to cash and shall distribute the cash as instructed by Owner.

8. Upon receipt of written notification from Owner certifying that the Contract is final and complete, and that Contractor has complied with all requirements and procedures applicable to the Contract, Escrow Agent shall release to Contractor all securities and interest on deposit less escrow fees

and charges of the Escrow Account. The escrow shall be closed immediately upon disbursement of all moneys and securities on deposit and payments of fees and charges.

9. Escrow Agent shall rely on written notifications from Owner and Contractor pursuant to Paragraphs 5 through 8, inclusive, of this Document 00 6290 and Owner and Contractor shall hold Escrow Agent harmless from Escrow Agent's release and disbursement of securities and interest as set forth.

10. Names of persons who are authorized to give written notice or to receive written notice on behalf of Owner and on behalf of Contractor in connection with the foregoing, and exemplars of their respective signatures are as follows:

ON BEHALF OF OWNER:

_____
Title

_____
Name

_____
Signature

_____
Address

_____
City/State/Zip Code

ON BEHALF OF CONTRACTOR:

_____
Title

_____
Name

_____
Signature

_____
Address

_____
City/State/Zip Code

ON BEHALF OF ESCROW AGENT:

_____
Title

_____
Name

_____
Signature

_____
Address

_____
City/State/Zip Code

IN WITNESS WHEREOF, the parties have executed this Escrow Agreement by their proper officers on the date first set forth above.

OWNER:

COASTSIDE FIRE PROTECTION DISTRICT

_____
Title

_____
Name

_____
Signature

CONTRACTOR

_____

_____
Title

_____
Name

_____
Signature

ATTEST

_____
Signature

_____
Print Name

Secretary

ESCROW AGENT

_____

_____
Title

_____
Print Name

_____
Signature

REVIEWED AS TO FORM:

_____
Counsel for Owner

_____
Print Name

_____
Date

At the time the Escrow Account is opened, Owner and Contractor shall deliver to Escrow Agent a fully executed counterpart of this Document 00 6290.

END OF DOCUMENT

DOCUMENT 00 6325

SUBSTITUTION REQUEST FORM

To: **COASTSIDE FIRE PROTECTION DISTRICT, Owner**

(Name TBD), Construction Manager

PROJECT: **Owner Project No:**	**Contractor:**

Substitution Request By:	Firm:

Transmittal Record	**Attn:**	**Firm:**	**Date Sent:**	**Date Rec'd:**	**Date Due:**
Contractor to Owner					
Contractor to Architect					
Owner / Architect to Consultant					
Architect to Owner Representative					
Owner Representative to Contractor					

We hereby submit for your consideration the following product instead of the specified item for the Project:

Section / Drawing	**Article**	**Specified Item**
Proposed Substitution:		

We have (a) attached manufacturer's literature, including complete technical data and laboratory test results, if applicable, (b) attached an explanation of why proposed substitution is a true equivalent to specified item, (c) included complete information on changes to Contract Documents that the proposed substitution will require for its proper installation, and (d) filled in the blanks below:

Contractor to complete questions that follow and certifies to the accuracy of all answers:

A.	Does the substitution affect dimensions shown on Drawings? Yes __ / No __. If No, please explain proposed mitigation and why substitution is equivalent to originally specified item:
B.	Will the undersigned pay for changes to the building design, including engineering and detailing costs caused by the requested substitution? Yes __ / No __. If No, please state reasons explain why substitution is equivalent to originally specified item:
C.	What effect does the substitution have on other trades? No effect: __ / Some effect__. If substitution will affect other trades, please explain the effect and why substitution is equivalent to originally specified item:
D.	Will substitution cause change to Project Schedule, or to critical delivery dates? Add? Shorten? If the substitution will add to schedule dates or affect critical activities, please explain why substitution is equivalent to originally specified item:
E.	Please describe differences between proposed substitution and specified item? Please explain and identify any and all differences, and please explain why substitution is equivalent to originally specified item:
F.	What is the Cost Differential to Contractor in original specified item and proposed substitution including all mark-ups? [If substitution requested during bid period, skip this question.]
G.	Are Manufacturer's guarantees for the proposed item the same as for item specified? Yes ____; No____. If No, please explain why substitution is equivalent to originally specified item:

H.	Contractor accepts full responsibility for delays caused by redesign of other items of the Work necessitated by substitution? Yes __ / No __. If No, please state reasons and explain why substitution is equivalent to originally specified item:
I.	Contractor states that the function, appearance and quality are equivalent or superior to the specified item? Yes __ / No __. If No, please explain why substitution is equivalent to originally specified item:

We certify that the function, appearance, and quality of the proposed substitution are equivalent or superior to those of the specified item, except as we may specifically state otherwise in this request.

Submitted by:_____ Signature: _____

Firm:_____ Date: _____

Address:_____ Phone/ Fax: _____

Remarks:_____

Consultant Response:
o Accepted
o Not Accepted
o Accepted As Noted
o Received Too Late

Remarks:_____

_____

By:_____

Owner Representative Response:
o Accepted
o Not Accepted
o Accepted As Noted
o Received Too Late

Remarks:_____

_____

By:_____

END OF DOCUMENT

DOCUMENT 00 6530

AGREEMENT AND RELEASE OF ANY AND ALL CLAIMS
[Public Contract Code Section 7100]

THIS AGREEMENT AND RELEASE OF ANY AND ALL CLAIMS (**Agreement and Release**), made and entered into this **[date]** day of **[Month]**, **[20___]**, by and between **COASTSIDE FIRE PROTECTION DISTRICT** (**Owner**), and **[Enter Name of Contractor]** (**Contractor**), whose place of business is at **[Enter Address of Contractor]**.

RECITALS

A. Owner and Contractor entered into Contract Number **[insert number]** (the "**Contract**") for construction of Owner **Fire Station #44 Replacement Project** located at **501 Stetson Street, Moss Beach, California.**

B. The Work under the Contract has been completed.

AGREEMENT

NOW THEREFORE, it is mutually agreed between Owner and Contractor as follows:

1. Contractor will not be assessed liquidated damages except as detailed below:

Original Contract Sum	$ _____
Modified Contract Sum	$ _____
Payment to Date	$ _____
Liquidated Damages	$ _____
Payment Due Contractor	$ _____

2. Subject to the provisions of this Agreement and Release, Owner will forthwith pay to Contractor the sum of [_____ Dollars and _____ Cents ($_____)] under the Contract, less any amounts withheld under the Contract or represented by any Notice to Withhold Funds on file with Owner as of the date of such payment.

3. Contractor acknowledges and hereby agrees that there are no unresolved or outstanding claims in dispute against Owner arising from the Contract, except for the claims described in Paragraph 4 of this Document 00 6530. It is the intention of the parties in executing this Agreement and Release that this Agreement and Release shall be effective as a full, final and general release of all claims, demands, actions, causes of action, obligations, costs, expenses, damages, losses and liabilities of Contractor against Owner, and all if its agents, employees, consultants, inspectors, representatives, assignees and transferees, except for the Disputed Claims set forth in Paragraph 4 of this Document 00 6530. Nothing in this Agreement and Release shall limit or modify Contractor's continuing obligations described in Paragraph 6 of this Document 00 6530.

4. The following claims submitted under Document 00 7200 (General Conditions), Article 12, are disputed (**Disputed Claims**) and are specifically excluded from the operation of this Agreement and Release.

[Insert information in Chart below, affix attachment if necessary]

CLAIM NO.	DATE SUBMITTED	DESCRIPTION OF CLAIM	AMOUNT OF CLAIM

5. Consistent with California Public Contract Code Section 7100, Contractor hereby agrees that, in consideration of the payment set forth in Paragraph 2 of this Document 00 6530, Contractor hereby releases and forever discharges Owner, and all of its agents, employees, consultants, inspectors, assignees and transferees from any and all liability, claims, demands, actions or causes of action of whatever kind or nature arising out of or in any way concerned with the Work under the Contract.

6. Guarantees and warranties for the Work, and any other continuing obligation of Contractor, shall remain in full force and effect as specified in the Contract Documents.

7. Contractor shall immediately defend, indemnify and hold harmless Owner, any of the Owner's Representatives, Project Manager, and all of their agents, employees, consultants, inspectors, assignees and transferees, from any and all claims, demands, actions, causes of action, obligations, costs, expenses, damages, losses and liabilities that may be asserted against them by any of Contractor's suppliers and/or Subcontractors of any tier and/or any suppliers to them for any and all labor, materials, supplies and equipment used, or contemplated to be used in the performance of the Contract, except for the Disputed Claims set forth in Paragraph 4 of this Document 00 6530.

8. Contractor hereby waives the provisions of California Civil Code Section 1542, which provide as follows:

> **A GENERAL RELEASE DOES NOT EXTEND TO CLAIMS WHICH THE CREDITOR DOES NOT KNOW OR SUSPECT TO EXIST IN HIS OR HER FAVOR AT THE TIME OF EXECUTING THE RELEASE, WHICH IF KNOWN BY HIM OR HER, MUST HAVE MATERIALLY AFFECTED HIS OR HER SETTLEMENT WITH THE DEBTOR.**

9. The provisions of this Agreement and Release are contractual in nature and not mere recitals and shall be considered independent and severable, and if any such provision or any part thereof shall be at any time held invalid in whole or in part under any federal, state, county, municipal or other law, ruling, or regulation, then such provision, or part thereof shall remain in force and effect only to the extent permitted by law, and the remaining provisions of this Agreement and Release shall also remain in full force and effect, and shall be enforceable.

10. Contractor represents and warrants that it is the true and lawful owner of all claims and other matters released pursuant to this Agreement and Release, and that it has full right, title and authority to enter into this instrument. Each party represents and warrants that it has been represented by counsel of its own choosing in connection with this Agreement and Release.

11. All rights of Owner shall survive completion of the Work or termination of the Contract, and execution of this Agreement and Release.

*** * * CAUTION: THIS IS A RELEASE - READ BEFORE EXECUTING * * ***

16. **OWNER: COASTSIDE FIRE PROTECTION DISTRICT**

By: _____
Signature

Name: _____
Print

Its: _____
Title

ATTEST:

_____
Secretary

_____
Print

[CONTRACTOR]

By: _____
Signature

Name: _____
Print

Its: _____
Title

[CONTRACTOR]

By: _____
Signature

Name: _____
Print

Its: _____
Title

REVIEWED AS TO FORM:

Dated: _____, [20__]

By: _____
Counsel for Owner

Name: _____
Print

END OF DOCUMENT

DOCUMENT 00 6536

GUARANTY

TO: The **COASTSIDE FIRE PROTECTION DISTRICT** (**Owner**), for construction of the **Fire Station #44 Replacement Project**, located at **501 Stetson Street, Moss Beach,** California.

The undersigned guarantees all construction performed on this Project and also guarantees all material and equipment incorporated therein.

1.01 Contractor hereby grants to Owner for a period of one year following the date of Final Acceptance of the Work completed, or such longer period specified in the Contract Documents, its unconditional warranty of the quality and adequacy of all of the Work including, without limitation, all labor, materials and equipment provided by Contractor and its Subcontractors of all tiers in connection with the Work.

1.02 Neither final payment nor use nor occupancy of the Work performed by the Contractor shall constitute an acceptance of Work not done in accordance with this Guaranty or relieve Contractor of liability in respect to any express warranties or responsibilities for faulty materials or workmanship. Contractor shall remedy any defects in the Work and pay for any damage resulting therefrom, which shall appear within one year, or longer if specified, from the date of Final Acceptance of the Work completed.

1.03 If within one year after the date of Final Acceptance, or such other period of time as may be prescribed by laws or regulations, or by the terms of Contract Documents or any extended warranty or guaranty, any Work is found to be Defective, Contractor shall promptly, without cost to Owner and in accordance with Owner's written instructions, correct such Defective Work. Contractor shall remove any Defective Work rejected by Owner and replace it with Work that is not Defective, and satisfactorily correct or remove and replace any damage to other Work or the work of others resulting therefrom. If Contractor fails to comply promptly with the terms of such instructions, or in an emergency where delay would cause serious risk of loss or damage, Owner may have the Defective Work corrected or the rejected Work removed and replaced. Contractor shall pay for all claims, costs, losses and damages caused by or resulting from such removal and replacement. Where Contractor fails to correct Defective Work, or defects are discovered outside the correction period, Owner shall have all rights and remedies granted by law.

1.04 Observation and inspection of the Work shall not relieve Contractor of any of its obligations under the Contract Documents. Even though equipment, materials, or Work required to be provided under the Contract Documents have been inspected, accepted, and estimated for payment, Contractor shall, at its own expense, replace or repair any such equipment, material, or Work found to be Defective or otherwise not to comply with the requirements of the Contract Documents up to the end of the guaranty period.

1.05 This Guaranty is in addition to any other Contractor warranties contained in the Contract Documents, and not in lieu of, any and all other Contractor liability imposed under the Contract Documents or at law. In the event of any conflict or inconsistency between the terms of this Guaranty and any Contractor warranty or obligation Contractor under the Contract Documents or at law, such inconsistency or conflict shall be resolved in favor of the greater protection to Owner.

Date: _____, 20___

_____
Contractor's name

By: _____
Signature

_____

Print Name

_____
Title

_____
Street Address

_____
City, State, Zip code

END OF DOCUMENT

DOCUMENT 00 7200

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ARTICLE 1 - INTERPRETATION OF CONTRACT DOCUMENTS

1.01 Interpretation Of Documents

A. Contract Documents are complementary; what is called for by one is as binding as if called for by all.

B. Individual Contract Documents subdivide at first level into Articles, and then into paragraphs.

1.02 Order Of Precedence Of Documents

A. In the case of discrepancy or ambiguity in the Contract Documents, the following order of precedence shall prevail:

1. Modifications in inverse chronological order (i.e., most recent first), and in the same order as specific portions they are modifying;
2. Agreement Forms (Document 00 5200 and other 5000 and 6000 series Documents), and terms and conditions referenced therein;
3. Supplementary General Conditions (Document 00 7301 and other 7300 series Documents), if included;
4. General Conditions (Document 00 7200);
5. Division 01 General Requirements, if included;
6. Drawings and Technical Specifications (Division 02 and above);
7. Written words over figures, unless obviously incorrect;
8. Figured dimensions over scaled dimensions;
9. Large-scale Drawings over small-scale Drawings.

B. Any conflict between Drawings and Technical Specifications (Division 2 and above) will be resolved in favor of the document of the latest date (i.e., the most recent document), and if the dates are the same or not determinable, then in favor of Specifications.

C. Any conflict between a bill or list of materials shown in the Contract Documents and the actual quantities required to complete Work required by Contract Documents, will be resolved in favor of the actual quantities.

D. All Technical Specifications included in the Project manual shall be included within the Contract Documents unless identified otherwise.

ARTICLE 2 - PRE-BID INVESTIGATIONS

2.01 Pre-Bid Investigations Required

A. Prior to and as a condition of submitting a Bid and executing Document 00 5200 (Agreement), Contractor shall make reasonable efforts to investigate fully the Work of the Contract. Contractor shall visit the Site, examine thoroughly and understand fully the nature and extent of the Contract Documents, Work, Site, locality, actual conditions and as-built conditions.

B. Contractor's investigation shall include, without limitation, requesting and thoroughly examining of all reports of exploration and tests of subsurface conditions, as-built drawings, drawings, product specification(s) or reports, made available by Owner for contracting purposes or during Contractor's pre-bid investigations, of existing above ground and (to the extent applicable) below ground conditions (together, **Existing Conditions Data**), including, as applicable, Underground Facilities, geotechnical data, as-built data, utility surveys, record documents of all types, hazardous materials surveys, or similar materials which may appear or be referenced in the Project Manual or the in the Contract Documents, and all local conditions, and federal, state and local laws and regulations that in any manner may affect cost, progress, performance or furnishing of Work or which relate to any aspect of the means, methods, techniques, sequences or procedures of construction to be employed by Contractor and safety precautions and programs incident thereto.

C. Contractor's investigations shall consider fully the fact that Existing Conditions Data is in many cases based on information furnished to Owner by others (e.g., the prior owner or builders), and

that due to their age or their chain of custody since preparation, may not meet current industry standards for accuracy. Contractor shall also: (i.) provide Owner with prompt written notice of all conflicts, errors, ambiguities, or discrepancies of any type, that it discovered in or among the Contract Documents and the Existing Conditions Data, and (ii.) subject to Owner's approval, conduct any such additional or supplementary examinations, investigations, explorations, tests, studies and data compilations, concerning conditions (surface, subsurface, and Underground Facilities) at or contiguous to the Site or otherwise, which Contractor may deem necessary in order to perform and furnish the Work in accordance with the terms and conditions of Contract Documents.

D. During performance of the Contract, Contractor will be charged with knowledge of all information that it should have learned in performing these pre-bid investigations and other obligations, and shall not be entitled to Change Orders (time or compensation) due to any information, error, inconsistency, omission, or conditions that Contractor should have known as a part of this Work. Contractor shall be responsible for the resultant losses, including, without limitation, the cost of correcting Defective Work.

2.02 Limited Reliance Permitted On Owner's Existing Conditions Data

A. Regarding aboveground and as-built conditions shown on the Contract Documents or supplied by Owner, such information has been compiled in good faith, however, Owner does not expressly or impliedly warrant or represent that such information is correctly shown or indicated, or otherwise complete for construction purposes. Contractor must independently verify such information as part of its pre-bid investigations, and where conditions are not reasonably verifiable or discrepancies are identified, bring such matters to Owner's attention through written question issued during the bid period. In executing Document 00 5200 (Agreement), Contractor shall rely on the results of its own independent investigation and shall not rely on Owner-supplied information regarding aboveground conditions and as-built conditions, and Contractor shall accept full responsibility for its verification work sufficient to complete the Work as intended.

B. Regarding subsurface conditions other than Underground Facilities shown on the Contract Documents or otherwise supplied by Owner, Contractor may rely only upon the general accuracy of actual reported depths, actual reported character of materials, actual reported soil types, actual reported water conditions, or actual obstructions shown or indicated in the Contract Documents. Owner is not responsible for the completeness of any subsurface condition information, Contractor's conclusions or opinions drawn from any subsurface condition information, or subsurface conditions that are not specifically shown. (For example, Owner is not responsible for soil conditions in areas contiguous to areas where a subsurface condition is shown.)

2.03 Pre-Bid Investigation Requirements For Excavation And Utilities Relocation Projects

A. As part of its pre-bid investigations for Projects involving excavation and/or relocation of existing utilities, Contractor shall make reasonable efforts to verify information regarding Underground Facilities, including but not limited to, requesting additional information or verification of information as necessary.

B. Because of the nature and location of Owner and the Project, the existence of Underground Facilities is deemed inherent in the Work of the Contract, as is the fact that Underground Facilities are not always accurately shown or completely shown on as-built records, both as to their depth and location. Contractor shall, therefore, take care to note the existence and potential existence of Underground Facilities, in particular, above and below grade structures, drainage lines, storm drains, sewers, water, gas, electrical, chemical, hot water, and other similar items and utilities. Contractor shall carefully consider all supplied information, request additional information Contractor may deem necessary, and visually inspect the Site for above ground indications of Underground Facilities (such as, for example not by way of limitation, the existence of existing service laterals, appurtenances or other types of utilities, indicated by the presence of an underground transmission main or other visible facilities, such as buildings, new asphalt, meters and junction boxes, on or adjacent to the Site). Contractor shall also consider local underground conditions and typical practices for Underground Facilities, either through its own direct knowledge or through its subcontractors, and fully consider this knowledge in assessing the existing information and the reasonableness of its reliance.

ARTICLE 3 - SUBCONTRACTORS

3.01 Subcontractor Listing Law

A. Contractor shall comply with the Subcontractor Listing law, Public Contract Code Section 4101, et seq. Contractor shall not substitute any other person or firm in place of any Subcontractor listed in the Bid except as may be allowed by law.

B. Subcontractors shall not assign or transfer their subcontracts or permit them to be performed by any other contractor without Owner's written approval. At Owner's request, Contractor shall provide Owner with a complete copy of all executed subcontracts or final commercial agreements with Subcontractors and/or suppliers.

3.02 Subcontracts

A. Subcontract agreements shall preserve and protect the rights of Owner under the Contract Documents so that subcontracting will not prejudice such rights. To the extent of the Work to be performed by a Subcontractor, Contractor shall require the Subcontractor's written agreement (i) to be bound to the terms of Contract Documents and (ii) to assume vis-à-vis Contractor all the obligations and responsibilities that Contractor assumes toward Owner under the Contract Documents. (These agreements include for example, and not by way of limitation, all warranties, claims procedures and rules governing submittals of all types to which Contractor is subject under the Contract Documents.)

B. Contractor shall provide for the assignment to Owner of all rights any Subcontractor (of any tier) may have against any manufacturer, supplier, or distributor for breach of warranties and guarantees relating to the Work performed by the Subcontractor under the Contract Documents. Subcontracts shall provide and acknowledge Owner as an intended third-party beneficiary of each subcontract and supply contract (of any tier).

ARTICLE 4 - DRAWINGS AND SPECIFICATIONS

4.01 Intent Of Drawings And Specifications

A. Contractor shall interpret words or phrases used to describe Work (including services), materials, or equipment that have well-known technical or construction industry or trade meaning in accordance with that meaning. Drawings' intent specifically includes the intent to depict construction that complies with all applicable laws, codes and standards.

B. As part of the **"Work,"** Contractor shall provide all labor, materials, equipment, machinery, tools, facilities, services, employee training and testing, hoisting facilities, Shop Drawings, storage, testing, security, transportation, disposal, the securing of all necessary or required field dimensions, the cutting or patching of existing materials, notices, permits, documents, reports, agreements and any other items required or necessary to timely and fully complete Work described and the results intended by Contract Documents and, in particular, Drawings and Specifications. Divisions and Specification Sections and the identification on any Drawings shall not control Contractor in dividing Work among Subcontractors or suppliers or delineating the Work to be performed by any specific trade.

C. Contractor shall perform reasonably implied parts of Work as **"incidental work"** although absent from Drawings and Specifications. Incidental work includes any work not shown on Drawings or described in Specifications that is necessary or normally or customarily required as a part of the Work shown on Drawings or described in Specifications. Incidental work includes any work necessary or required to make each installation satisfactory, legally operable, functional, and consistent with the intent of Drawings and Specifications or the requirements of Contract Documents. Contractor shall perform incidental work without extra cost to Owner. Incidental work shall be treated as if fully described in Specifications and shown on Drawings, and the expense of incidental work shall be included in price Bid and Contract Sum.

4.02 Checking Of Drawings And Specifications

A. Before undertaking each part of Work, Contractor shall carefully study and compare Contract Documents and check and verify pertinent figures shown in the Contract Documents and all

applicable field measurements. Contractor shall be responsible for any errors that might have been avoided by such comparison. Figures shown on Drawings shall be followed; Contractor shall not scale measurements. Contractor shall promptly report to Owner, in writing, any conflict, error, ambiguity or discrepancy that Contractor may discover. Contractor shall obtain a written interpretation or clarification from Owner before proceeding with any Work affected thereby. Contractor shall provide Owner with a follow-up correspondence every ten Days until it receives a satisfactory interpretation or clarification.

4.03 Interpretation Of Drawings And Specifications

A. A typical or representative detail on Drawings shall constitute the standard for workmanship and material throughout corresponding parts of Work. Where necessary, and where reasonably inferable from Drawings, Contractor shall adapt such representative detail for application to such corresponding parts of Work. The details of such adaptation shall be subject to prior approval by Owner. Repetitive features shown in outline on Drawings shall be in exact accordance with corresponding features completely shown.

B. Should any discrepancy appear or any misunderstanding arise as to the import of anything contained in Drawings and Specifications, or should Contractor have any questions or requests relating to Drawings or Specifications, Contractor shall refer the matter to Owner, in writing, with a copy to the Architect/Engineer. Owner will issue with reasonable promptness written responses, clarifications or interpretations as Owner may determine necessary, which shall be consistent with the intent of and be reasonably inferable from Contract Documents. Such written clarifications or interpretations shall be binding upon Contractor. If Contractor believes that a written response, clarification or interpretation justifies an adjustment in the Contract Sum or Contract Time, Contractor shall give Owner prompt written notice. If the parties are unable to agree to the amount or extent of the adjustment, if any, then Contractor shall perform the Work in conformance with Owner's response, clarification, or interpretation and may make a written claim for the adjustment as provided in Article 12.

C. The following general specifications shall apply wherever in the Specifications, or in any directions given by Owner in accordance with or supplementing Specifications, it is provided that Contractor shall furnish materials or manufactured articles or shall do Work for which no detailed specifications are shown. Materials or manufactured articles shall be of the best grade, in quality and workmanship, obtainable in the market from firms of established good reputation. If not ordinarily carried in stock, the materials or manufactured articles shall conform to industry standards for first class materials or articles of the kind required, with due consideration of the use to which they are to be put. Work shall conform to the usual standards or codes, such as those cited herein, for first class work of the kind required. Contractor shall specify in writing to Owner, at least 10 Business Days prior to furnishing such materials or performing such Work, the materials to be used or Work to be performed under this Paragraph.

4.04 Use Of Drawings And Specifications.

A. Drawings, Specifications and other Contract Documents were prepared for use for Work of Contract Documents only. No part of Contract Documents shall be used for any other construction or for any other purpose except with the written consent of Owner. Any unauthorized use of Contract Documents is prohibited and at the sole liability of the user.

ARTICLE 5 - COMMENCEMENT OF THE WORK

5.01 Submission Of Required Schedules

A. Contractor shall submit to Owner in draft for review and discussion at the Preconstruction Conference, and in final prior to the first payment application, the following schedules:

1. Schedule of Values (See attached Sample for reference, for level of detail expected
2. Progress Schedule, and
3. Schedule of Submittals (See attached Submittal List for reference)

B. No progress payment shall be due or owing to Contractor until such schedules are submitted to and acceptable to Owner and/or Architect/Engineer as meeting the requirements of the Contract

Documents. In Owner's sole discretion, Owner may elect to instead withhold a portion of any progress payment for unacceptable compliance with contract requirements for such schedules.

C. Owner's acceptance of Contractor's schedules will not create any duty of care or impose on Owner any responsibility for the sequencing, scheduling or progress of Work nor will it interfere with or relieve Contractor from Contractor's full responsibility therefore.

5.02 Commencement Date Of Contract Time

A. The Contract Time will commence to run on the 60th Day after the issuance of the Notice of Award or, if a Notice to Proceed is given, on the date indicated in the Notice to Proceed.

B. Owner may give a Notice to Proceed at any time within 60 Days after the Notice of Award. Contractor shall not do any Work at the Site prior to the date on which the Contract Time commences to run.

ARTICLE 6 - CONTRACTOR'S ORGANIZATION AND EQUIPMENT

6.01 Contractor's Legal Address

A. Address and facsimile number given in Contractor's Bid are hereby designated as Contractor's legal address and facsimile number. Contractor may change its legal address and facsimile number by notice in writing, delivered to Owner, which in conspicuous language advises Owner of a change in legal address or facsimile number, and which Owner accepts in writing. Delivery to Contractor's legal address or depositing in any post office or post office box regularly maintained by the United States Postal Service, in a wrapper with postage affixed, directed to Contractor at Contractor's legal address, or of any drawings, notice, letter or other communication, shall be deemed legal and sufficient service thereof upon Contractor. Facsimile to Contractor's designated facsimile number of any letter, memorandum, or other communication on standard or legal sized paper, with proof of facsimile transmission, shall be deemed legal and sufficient service thereof upon Contractor.

6.02 Contractor's Superintendents Or Forepersons

A. Contractor shall at all times be represented on Site by one or more superintendents or forepersons authorized and competent to receive and carry out any instructions that Owner may give, and shall be liable for faithful observance of instructions delivered to Contractor or to authorized representative or representatives on Site.

6.03 Proficiency In English

A. Supervisors, security guards, safety personnel and employees who have unescorted access to the Site shall possess proficiency in the English language in order to understand, receive and carry out oral and written communications or instructions relating to their job functions, including safety and security requirements.

6.04 Contractor's And Subcontractors' Employees

A. Contractor shall employ, and shall permit its Subcontractors to employ, only competent and skillful personnel to do Work. If Owner notifies Contractor that any of its employees, or any of its Subcontractors' employees on Work is incompetent, unfaithful, disorderly or profane, or fails to observe customary standards of conduct or refuses to carry out any provision of the Contract Documents, or uses threatening or abusive language to any person on Work representing Owner, or violates sanitary rules, or is otherwise unsatisfactory, and if Owner requests that such person be discharged from Work, then Contractor or its Subcontractor shall immediately discharge such person from Work and the discharged person shall not be re-employed on the Work except with consent of Owner.

6.05 Contractor's Use Of The Site

A. Contractor shall not make any arrangements with any person to permit occupancy or use of any land, structure or building within the limits of the Work, for any purpose whatsoever, either with or without compensation, in conflict with any agreement between Owner and any Owner, former Owner or tenant of such land, structure or buildings. Contractor may not occupy Owner-owned

property outside the limit of the Work as indicated on the Drawings unless it obtains prior approval from Owner.

6.06 Contractor's Site Office

A. Unless expressly provided otherwise in the Contract Documents, Contractor shall provide a site office staffed by a resident project manager or job superintendent.

ARTICLE 7 - OWNER'S ADMINISTRATION OF WORK

7.01 Owner's Representative(s)

A. Owner's Representative(s) will have limited authority to act on behalf of Owner as set forth in the Contract Documents.

B. Except as otherwise provided in these Contract Documents or subsequently identified in writing by Owner, Owner will issue all communications to Contractor through Owner's Representative, and Contractor shall issue all communications to Owner through Owner's Representative in a written document delivered to Owner.

C. Should any direct communications between Contractor and Owner's consultants, architects or engineers not identified in Article 2 of Document 00 5200 (Agreement) occur during field visits or by telephone, Contractor shall immediately confirm them in a written document copied to Owner.

7.02 Owner's Observation Of The Work

A. Work shall be performed under Owner's general observation and administration. Contractor shall comply with Owner's directions and instructions in accordance with the terms of Contract Documents, but nothing contained in these General Conditions shall be taken to relieve Contractor of any obligations or liabilities under the Contract Documents. Owner's failure to review or, upon review, failure to object to any aspect of Work reviewed, shall not be deemed a waiver or approval of any non-conforming aspect of Work.

B. Subject to those rights specifically reserved in the Contract Documents, Owner will not supervise, or direct, or have control over, or be responsible for, Contractor's means, methods, techniques, sequences or procedures of construction, or the safety precautions and programs incident thereto, or Contractor's failure to comply with laws and regulations applicable to the furnishing or performance of Work. Owner will not be responsible for Contractor's failure to perform or furnish the Work in accordance with Contract Documents.

7.03 Consultant's Observation Of Work

A. Owner may engage one or more of the following to assist in administering the Work: an Architect/Engineer, Project Manager, Construction Manager, or any other independent consultant (collectively for purposes of this Article 7, **Consultant**). If so engaged, Consultant will advise and consult with Owner, but will have authority to act on behalf of Owner only to extent provided in the Contract Documents or as set forth in writing by Owner. Consultant will not be responsible for and will not have control or charge of construction means, methods, techniques, sequences or procedures, or for safety precautions and programs in connection with Work. Consultant will not be responsible for or have control over the acts or omissions of Contractor, Subcontractors or their agents or employees, or any other persons performing Work.

B. Consultant may review Contractor's Submittals, such as Shop Drawings, Product Data, and Samples, but only for conformance with design concept of Work and with information given in the Contract Documents.

C. Consultant may visit the Site at intervals appropriate to stage of construction to become familiar generally with the progress and quality of Work and to determine in general if Work is proceeding in accordance with Contract Documents. Based on its observations, Consultant may recommend to Owner that it disapproves or rejects Work that Consultant believes to be Defective or will not produce a complete Project that conforms to Contract Documents, or will prejudice the integrity of the design concept of the completed Project as a functioning whole as indicated by Contract Documents. Consultant may also recommend to Owner special inspection or testing of Work, whether or not the Work is fabricated, installed, or completed.

D. Consultant may conduct observations or inspections to recommend to Owner the dates that Contractor has achieved Substantial Completion and Final Completion, and will receive and forward to Owner for review written warranties and related documents required by Contract Documents.

7.04 Owner's And Consultant's Exercise Of Contract Responsibilities

A. Owner, Consultant, and all Owner's representatives, in performing their duties and responsibilities under the Contract Documents, accept no duties, responsibilities or duty of care, nor may the same be implied or inferred, towards Contractor, any Subcontractor, sub-Subcontractor or supplier, except those set forth expressly in the Contract Documents.

7.05 Owner's Right Of Access To The Work

A. During performance of Work, Owner, Consultant, and all Owner's representatives may at any time enter upon Work, shops or studios where any part of the Work may be in preparation, or factories where any materials for use in Work are being or are to be manufactured, and Contractor shall provide proper and safe facilities for this purpose, and shall make arrangements with manufacturers to facilitate inspection of their processes and products to such extent as Owner's interests may require. Other contractors performing work for Owner may also enter upon Work for all purposes required by their respective contracts. Subject to the rights reserved in the Contract Documents, Contractor shall have sole care, custody, and control of the Site and its Work areas.

7.06 Owner's Right Of Separate Construction

A. Owner may perform with its own forces, construction or operations related to the Project, or the Site during Contractor's operations. Owner may also award separate contracts in connection with other portions of the Project or other construction or operations, on the Site or areas contiguous to the Site, under conditions similar to these Contract Documents, or may have utility Owners perform other work.

B. Contractor shall adjust its schedule and fully coordinate with and shall afford all other contractors, utility districts and Owner (if Owner is performing work with its own forces), proper and safe access to the Site, and reasonable opportunity for the installation and storage of their materials. Contractor shall ensure that the execution of its Work properly connects and coordinates with others' work, do all cutting, fitting and patching of the Work that may be required to make its several parts come together properly and integrate with such other work, and shall cooperate with them to facilitate the progress of the Work.

C. To the extent that any part of Contractor's Work is to interface with work performed or installed by other contractors or utility owners, Contractor shall inspect and measure the in-place work. Contractor shall promptly report to Owner in writing any defect in in-place work that will impede or increase the cost of Contractor's interface unless corrected.

ARTICLE 8 - CONTRACTOR'S PROSECUTION AND PROGRESS OF THE WORK

8.01 Contractor To Supervise The Work

A. Subject to those rights specifically reserved in the Contract Documents, Contractor shall supervise, direct, have control over, and be responsible for, Contractor's means, methods, techniques, sequences or procedures of construction, safety precautions and programs incident thereto, and compliance with laws and regulations applicable to the furnishing or performance of Work.

B. Contractor shall keep on the Site at all times during Work progress a competent resident Superintendent, who shall not be replaced without Owner's express written consent and, if applicable, payment of liquidated damages as required by Document 00 5200 (Agreement). The Superintendent shall be Contractor's representative at the Site and shall have complete authority to act on behalf of Contractor. All communications to and from the Superintendent shall be as binding as if given to or by Contractor.

C. Contractor shall supervise, inspect, and direct Work competently and efficiently, devoting the attention and applying such personal skills and expertise as may be required and necessary to perform Work in accordance with Contract Documents. Contractor shall be solely responsible for and have control and charge of construction means, methods, techniques, sequences and

procedures, safety precautions and programs in connection with the Work. Contractor shall be responsible to see that the completed Work complies accurately with Contract Documents.

D. Contractor is fully responsible for Contractor's own acts and omissions. Contractor is responsible for all acts and omissions of its Subcontractors, suppliers, and other persons and organizations performing or furnishing any of the Work, labor, materials, or equipment under a direct or indirect contract with Contractor.

E. Contractor shall conduct monthly Contractor Safety Committee meetings, and weekly toolbox safety talks.

8.02 Contractor To Maintain Cost Data

A. Contractor shall maintain full and correct information as to the number of workers employed in connection with each subdivision of Work, the classification and rate of pay of each worker in form of certified payrolls, the cost to Contractor of each class of materials, tools and appliances used by Contractor in Work, and the amount of each class of materials used in each subdivision of Work. Contractor shall provide Owner with monthly summaries of this information. If Contractor maintains or is capable of generating summaries or reports comparing actual Project costs with Bid estimates or budgets, Contractor shall provide Owner with a copy of such report upon Owner's request.

B. Contractor shall maintain daily job reports recording all significant activity on the job, including the number of workers on Site, Work activities, problems encountered and delays. Contractor shall provide Owner with copies for each Day Contractor works on the Project, to be delivered to Owner either the same Day or the following morning before starting work at the Site. Contractor shall take pre-construction and monthly progress photographs of all areas of the Work. Contractor shall maintain copies of all correspondence with Subcontractors and records of meetings with Subcontractors.

C. Owner shall have the right to audit and copy Contractor's books and records of any type, nature or description relating to the Project (including, without limitation, financial records reflecting in any way costs claimed on the Project), and to inspect the Site, including Contractor's trailer, or other job Site office, and this requirement shall be contained in the subcontracts of Subcontractors working on Site. By way of example, Owner shall have the right to inspect and obtain copies of all Contract Documents, planning and design documents, Bid proposal and negotiation documents, cost records and job cost variance reports, design modification proposals, value engineering or other cost reduction proposals, revisions made to the original design, job progress reports, photographs, and as-built drawings maintained by Contractor. Owner and any other applicable governmental entity shall have the right to inspect all information and documents maintained hereunder at any time during the Project and for a period of five years following Final Completion, in accordance with the provisions of the Government Code Section 8546.7. This right of inspection shall not relieve Contractor of its duties and obligations under the Contract Documents. This right of inspection shall be specifically enforceable in a court of law, either independently or in conjunction with enforcement of any other rights in the Contract Documents.

8.03 Contractor To Supply Sufficient Workers And Materials

A. Unless otherwise required by Owner under the terms of Contract Documents, Contractor shall at all times keep on the Site materials and employ qualified workers sufficient to prosecute Work at a rate and in a sequence and manner necessary to complete Work within the Contract Time. This obligation shall remain in full force and effect notwithstanding disputes or claims of any type.

B. At any time during progress of Work should Contractor directly or indirectly (through Subcontractors) refuse, neglect, or be unable to supply sufficient materials or employ qualified workers to prosecute the Work as required, then Owner may require Contractor to accelerate the Work and/or furnish additional qualified workers or materials as Owner may consider necessary, at no cost to Owner. If Contractor does not comply with the notice within three Business Days of date of service thereof, Owner shall have the right (but not a duty) to provide materials and qualified workers to finish the Work or any affected portion of Work, as Owner may elect. Owner may, at its discretion, exclude Contractor from the Site, or portions of the Site or separate work elements during the time period that Owner exercises this right. Owner will deduct from moneys due or which may thereafter become due under the Contract Documents, the sums necessary to meet expenses

thereby incurred and paid to persons supplying materials and doing Work. Owner will deduct from funds or appropriations set aside for purposes of Contract Documents the amount of such payments and charge them to Contractor as if paid to Contractor. Contractor shall remain liable for resulting delay, including liquidated damages and indemnification of Owner from claims of others.

C. Exercise by Owner of the rights conferred upon Owner in this subparagraph is entirely discretionary on the part of Owner. Owner shall have no duty or obligation to exercise the rights referred to in this subparagraph and its failure to exercise such rights shall not be deemed an approval of existing Work progress or a waiver or limitation of Owner's right to exercise such rights in other concurrent or future similar circumstances. (The rights conferred upon Owner under this subparagraph are, like all other such rights, cumulative to Owner's other rights under any provision of the Contract Documents.)

8.04 Contractor To Maintain Project Record Documents

A. Contractor shall maintain in a safe place at the Site one record copy of all Drawings, Specifications, Addenda, Contract Modifications, Change Orders, Work Directives, Force Account orders, and written interpretations and clarifications in good order and annotated to show all as-built changes made during construction. These Project Record Documents, together with all approved Samples and a counterpart of all approved Shop Drawings, shall be maintained and available to Owner for reference. Upon completion of the Work, Contractor shall deliver to Owner, the Project Record Documents, Samples and Shop Drawings and as-built drawings.

B. Throughout Contractor's performance of the Work of the Project, Contractor shall maintain construction records to include: shop drawings; product data/material data sheets; samples; submittal; purchases; materials; equipment; inspections; applicable handbooks; applicable codes and standards; maintenance and operating manuals and instructions; RFI Log; Submittal Log; other related documents and revisions which arise out of the Construction Contracts. Contractor shall maintain records of principal building layout lines, elevations for the bottom of footings, floor levels, and key site elevations (certified by a qualified surveyor or professional engineer). Contractor shall make all records available to Owner. At the completion of the Project, Contractor shall deliver all such records to the Owner to have a complete set of record as-built drawings.

8.05 Contractor To Not Disrupt Owner Operation

A. Contractor shall schedule and execute all Work in a manner that does not interfere with or disrupt Owner operations including, without limitation, parking, utilities (electricity, gas, water, sewer), noise, access by employees and administration, access by vendors, physicians, patients and any other person or entity using Owner facilities or doing business with Owner. Contractor shall produce and supply coordination plans and requests to Owner, following Owner procedures, for all necessary interference of construction with Owner, which Owner will reasonably cooperate with.

8.06 Contractor To Provide Temporary Facilities And Controls

A. Unless expressly provided otherwise in the Contract Documents, Contractor shall provide all temporary utilities (including without limitation electricity, water, sewer, natural gas), lighting, heating, cooling and ventilating devices, telephone, sanitary facilities, barriers, fences and enclosures, tree and plant protection, fire protection, pollution, erosion, Storm Water Pollution Prevention controls, noise and traffic control, and any other necessary services required for construction, testing or completion of the Work.

ARTICLE 9 - WARRANTY, GUARANTY, AND INSPECTION OF WORK

9.01 Warranty And Guaranty

A. General Representations and Warranties: Contractor represents and warrants that it is and will be at all times fully qualified and capable of performing every Phase of the Work and to complete Work in accordance with the terms of Contract Documents. Contractor warrants that all construction services shall be performed in accordance with generally accepted professional standards of good and sound construction practices and all requirements of Contract Documents. Contractor

warrants that Work including , without limitation, each item of materials and equipment incorporated therein, shall be new, of suitable grade of its respective kind for its intended use, and free from defects in design, engineering, materials, construction and workmanship. Contractor warrants that Work shall conform in all respects with all applicable requirements of federal, state and local laws, applicable construction codes and standards, licenses, and permits, Drawings and Specifications and all descriptions set forth therein, and all other requirements of Contract Documents. Contractor shall not be responsible, however, for the negligence of others in the specification of specific equipment, materials, design parameters and means or methods of construction where that is specifically shown and expressly required by Contract Documents.

B. Extended Warranties: Any warranty exceeding one year provided by the supplier or manufacturer of any equipment or materials used in the Project shall be extended for such term. Contractor expressly agrees to act as co-guarantor of such equipment and materials and shall supply Owner with all warranty and guarantee documents relative to equipment and materials incorporated in the Project and guaranteed by their suppliers or manufacturers.

C. Environmental and Toxics Warranty: The covenants, warranties and representations contained in this Paragraph are effective continuously during Contractor's Work on the Project and following cessation of labor for any reason including, without limitation, Project completion. Contractor covenants, warrants and represents to Owner that:

1. To Contractor's knowledge after due inquiry, no lead or Asbestos-containing materials were installed or discovered in the Project at any time during Contractor's construction thereof. If any lead or Asbestos-containing materials were discovered, Contractor made immediate written disclosure to Owner.
2. To Contractor's knowledge after due inquiry, no electrical transformers, light fixtures with ballasts or other equipment containing PCBs are or were located on the Project at any time during Contractor's construction thereof.
3. To Contractor's knowledge after due inquiry, no storage tanks for gasoline or any other toxic substance are or were located on the Project at any time during Contractor's construction thereof. If any such materials were discovered, Contractor made immediate written disclosure to Owner.
4. Contractor's operations concerning the Project are and were not in violation of any applicable environmental federal, state, or local statute, law or regulation dealing with hazardous materials substances or toxic substances and no notice from any governmental body has been served upon Contractor claiming any violation of any such law, ordinance, code or regulation, or requiring or calling attention to the need for any Work, repairs, construction, alteration, or installation on or in connection with the Project in order to comply with any such laws, ordinances, codes, or regulations, with which Contractor has not complied. If there are any such notices with which Contractor has complied, Contractor shall provide Owner with copies thereof.

9.02 Inspection Of Work

A. Work and materials, and manufacture and preparation of materials, from beginning of construction until Final Completion and acceptance of Work, shall be subject to inspection and rejection by Owner, its agents, representatives or independent contractors retained by Owner to perform inspection services, or governmental agencies with jurisdictional interests. Contractor shall provide them proper and safe conditions for such access and advise them of Contractor's Site safety procedures and program so that they may comply therewith as applicable. Upon request or where specified, Owner shall be afforded access for inspection at the source of supply, manufacture or assembly of any item of material or equipment, with reasonable accommodations supplied for making such inspections.

B. Contractor shall furnish, in such quantities and sizes as may be required for proper examination and tests, Samples or test specimens of all materials to be used or offered for use in connection with Work. Contractor shall prepare Samples or test specimens at its expense and furnish them to Owner. Contractor shall submit all Samples in ample time to enable Owner to make any necessary tests, examinations, or analyses before the time it is desired to incorporate the material into the Work.

C. Contractor shall give Owner timely notice of readiness of Work for all required inspections, tests or approvals, and shall cooperate with inspection and testing personnel to facilitate required inspections or tests.

D. If applicable laws or regulations of any public body having jurisdiction require any Work (or part thereof) specifically to be inspected, tested or approved by an employee or other representative of such public body, Contractor shall assume full responsibility for arranging and obtaining such inspections, tests or approvals, and furnish Owner with the required certificates of inspection, or approval. Owner will pay the cost of initial testing and Contractor shall pay all costs in connection with any follow-up or additional testing. Contractor shall also be responsible for arranging and obtaining and shall pay all costs in connection with any inspections, tests or approvals required for the acceptance of materials or equipment to be incorporated in the Work, or of materials, mix designs, or equipment submitted for approval prior to Contractor's purchase thereof for incorporation in the Work.

E. If Contractor covers any Work, or the work of others, prior to any required inspection, test or approval without written approval of Owner, Contractor shall uncover the Work at Owner's request. Contractor shall bear the expense of uncovering Work and replacing Work. In any case where Contractor covers Work contrary to Owner's request, Contractor shall uncover Work for Owner's observation or inspection at Owner's request. Contractor shall bear the cost of uncovering Work.

F. Whenever required by Owner, Contractor shall furnish tools, labor and materials necessary to make examination of Work that may be completed or in progress, even to extent of uncovering or taking down portions of finished Work. Should Work be found unsatisfactory, cost of making examination and of reconstruction shall be borne by Contractor. If Work is found to be satisfactory, Owner, in manner herein prescribed for paying for alterations, Modifications, and extra Work, except as otherwise herein specified, will pay for examination.

G. Inspection of the Work by or on behalf of Owner, or Owner's failure to do so, shall not under any circumstances be deemed a waiver or approval of any non-conforming aspect of the Work. Contractor shall have an absolute duty, in the absence of a written Change Order signed by Owner, to perform Work in conformance with the Contract Documents and to immediately correct Defective Work immediately upon Contractor's knowledge.

H. Any inspection, evaluation, or test performed by or on behalf of Owner relating to the Work is solely for the benefit of Owner, and shall not be relied upon by Contractor. Contractor shall not be relieved of the obligation to perform Work in accordance with the Contract Documents, nor relieved of any guaranty, warranty, or other obligation, as a result of any inspections, evaluations, or tests performed by Owner, whether or not such inspections, evaluations, or tests are permitted or required under the Contract Documents. Contractor shall be solely responsible for testing and inspecting Work already performed to determine whether such Work is in proper condition to receive later Work.

9.03 Correction Of Defective Work

A. Owner may direct Contractor to correct any Defective Work or remove it from the Site and replace it with Work that is not Defective and satisfactorily correct or remove and replace any damage to other Work or the work of others resulting from the correction or removal. Also, if Contractor fails to supply sufficient skilled workers, suitable materials or equipment, or to furnish or perform the Work in such a way that the completed Work will conform to Contract Documents, Owner may direct Contractor to perform the Work in accordance with the Contract Documents, correct or replace any such Defective Work, or stop any portion of Work.

B. Owner may correct and remedy the Defective Work or perform any other work, corrective or otherwise, if, after five Days' written notice to Contractor, Contractor fails to correct Defective Work or to remove and replace rejected Work; or provide a plan for correction of Defective Work acceptable to Owner; or perform Work in accordance with Contract Documents. In connection with such corrective and remedial action, Owner may exclude Contractor from all or part of the Site; take possession of all or part of Work and suspend Contractor's Work related thereto; take possession of all or part of Contractor's tools, appliances, construction equipment and machinery at the Site; and incorporate in Work any materials and equipment stored at the Site or for which Owner has paid Contractor but which are stored elsewhere. Contractor shall allow Owner, its

representatives, agents, employees, and other contractors and consultants' access to the Site to enable Owner to exercise the rights and remedies under this Paragraph.

C. Contractor shall be responsible for all claims, costs, losses, damages, expenses and liabilities incurred or sustained by Owner in exercising rights and remedies under this Paragraph. Contractor shall be responsible for any and all claims, costs, losses and damages caused by or resulting from such correction or removal. A Change Order will be issued incorporating the necessary revisions in the Contract Documents with respect to the Work and the Contract Sum. If the parties are unable to agree to the amount of an appropriate decrease in the Contract Sum, Owner may decide the proper amount or, in its discretion may elect to leave the Contract Sum unchanged and deduct from monies due Contractor, all such claims, costs, losses and damages caused by or resulting from exercising its rights and remedies. If Contractor disagrees with Owner's calculations, it may make a claim as provided in Article 12 of this Document 00 7200.

D. These Owner rights and remedies are entirely discretionary on the part of Owner, and shall not give rise to any duty on the part of Owner to exercise the rights for the benefit of Contractor or any other party. Owner's rights under this Paragraph shall be in addition to any other rights it may have under the Contract Documents or by law.

9.04 Acceptance of Defective Work

A. Owner may in its sole discretion elect to accept Defective Work. Contractor shall pay all claims, costs, losses and damages attributable to Owner's evaluation of and determination to accept such Defective Work. If Owner accepts any Defective Work prior to final payment, a Change Order will be issued incorporating the necessary revisions in the Contract Documents with respect to the Work and the Contract Sum. If the parties are unable to agree to the amount of an appropriate decrease in the Contract Sum, Owner may deduct from monies due Contractor, all claims, costs, losses, damages, expenses and liabilities attributable to the Defective Work. If Contractor disagrees with Owner's calculations, Contractor may make a claim as provided in Article 12 of this Document 00 7200. If Owner accepts any Defective Work after final payment, Contractor shall pay to Owner, an appropriate amount as determined by Owner.

9.05 Rights Upon Inspection, Correction Or Acceptance

A. Contractor shall not be allowed an extension of Contract Time because of any delay in the performance of Work attributable to the exercise by Owner of its rights and remedies under this Article. Where Owner exercises its rights under this Article, it retains and may still exercise all other rights it has by law or under the Contract Documents including, without limitation, the right to terminate Contractor's right to proceed with the Work under the Contract Documents for cause and/or make a claim or back charge where a Change Order cannot be agreed upon.

B. Observation or inspection by Owner or its authorized agents or representatives shall not relieve Contractor of its obligation to have furnished material and workmanship in accordance with Contract Documents. Payment for Work completed through periodic progress payments, final payment or otherwise shall not operate to waive Owner's right to require full compliance with Contract Documents and shall in no way be deemed as acceptance of any defective Work paid therefor. Contractor's obligation to complete the Work in accordance with Contract Documents shall be absolute, unless Owner agrees otherwise in writing.

9.06 Proof Of Compliance Of Contract Provisions

A. In order that Owner may determine whether Contractor has complied or is complying with requirements of Contract Documents not readily enforceable through inspection and tests of Work and materials, Contractor shall at any time, when requested, submit to Owner properly authenticated documents or other satisfactory proofs of compliance with all applicable requirements.

B. Before commencing any portion of Work, Contractor shall inform Owner in writing as to time and place at which Contractor wishes to commence Work, and nature of Work to be done, in order that proper provision for inspection of Work may occur, and to assure measurements necessary for record and payment. Information shall be given to Owner a reasonable time in advance of time at which Contractor proposes to begin Work, so that Owner may complete necessary preliminary work without inconvenience or delay to Contractor.

9.07 Correction Period And Project Warranty Period:

A. If within one year after the date of Final Acceptance, or such longer period of time as may be prescribed by laws, regulations or by the terms of Contract Documents or any extended warranty or guaranty, any Work (completed or incomplete) is found to be Defective, Contractor shall promptly without cost to Owner and in accordance with Owner's written instructions, correct such Defective Work. Contractor shall remove any Defective Work rejected by Owner and replace it with Work that is not Defective, and satisfactorily correct or remove and replace any damage to other Work or the work of others resulting therefrom. If Contractor fails to promptly comply with the terms of such instructions, or in an emergency where delay would cause serious risk of loss or damage, Owner may have the Defective Work corrected or the rejected Work removed and replaced. Contractor shall pay for all claims, costs, losses and damages caused by or resulting from such removal and replacement. Where Contractor fails to correct Defective Work, or defects are discovered outside the correction period, Owner shall have all rights and remedies granted by law.

B. In special circumstances where a part of the Work is occupied or a particular item of equipment is placed in continuous service before Final Acceptance of all the Work, the correction period for that part of Work or that item may start to run from an earlier date if so provided by Change Order.

C. Where Defective Work or rejected Work (and damage to other Work resulting therefrom) has been corrected, removed, or replaced under this Paragraph after the commencement of the correction period, the correction period hereunder with respect to such Work shall be extended for an additional period of one year after such correction or removal and replacement has been satisfactorily completed.

9.08 No Waiver

A. Neither recordation of Final Acceptance nor final certificate for payment nor provision of the Contract nor partial or entire use or occupancy of premises by Owner shall constitute acceptance of Work not done in accordance with Contract Documents nor relieve Contractor of liability in respect to express warranties or responsibility for faulty materials or workmanship.

B. If, after installation, operation, or use of materials or equipment to be provided under Contract proves to be unsatisfactory to Owner, Owner shall have right to operate and use materials or equipment until said materials and equipment can, without damage to Owner, be taken out of service for correction or replacement. Period of use of Defective materials or equipment pending correction or replacement shall in no way decrease guarantee period required for acceptable corrected or replaced items of materials or equipment.

C. Nothing in the Contract Documents shall be construed to limit, relieve, or release Contractor's, Subcontractors', and equipment suppliers' liability to Owner for damages sustained as result of latent defects in materials or equipment caused by negligence of Contractor, its agents, suppliers, employees, or Subcontractors.

ARTICLE 10 - MODIFICATIONS OF CONTRACT DOCUMENTS

10.01 Owner's Right To Direct Changed Work.

A. Owner may, without notice to the sureties and without invalidating the Contract, make changes in the Work (**Changed Work**) including, without limitation: alterations, deviations, additions to, or deletions from Contract Documents; increase or decrease the quantity of any item or portion of the Work; expand, reduce or otherwise change the Contract Time; delete any item or portion of the Work; and require extra Work. Contractor shall perform such Work under applicable provisions of the Contract Documents, unless specifically provided otherwise at the time the change is ordered. In the case of any ordered extra Work, Owner reserves the right to furnish all or portions of associated labor, material, and equipment, which Contractor shall accept and use without payment for costs, markup, profit, or otherwise for such Owner-furnished labor, materials, and equipment.

B. If Changed Work is of such a nature as to increase or decrease the time or cost of any part of Work, price fixed in Contract shall be increased or decreased by amount as the Contractor and Owner may agree upon as reasonable and proper allowance for increase or decrease in cost of Work using the cost guidelines set forth in this Article, and absent such agreement, then as Owner may direct (with Contractor retaining its rights under Article 12 herein).

10.02 Required Documentation For Changed Work

A. Changes affecting the Contract Time or Contract Sum of the Work shall be set forth in a written Change Order or Change Directive that shall specify:

1. The Work performed in connection with the change to be made;
2. The amount of the adjustment of the Contract Sum, if any, and the basis for compensation for the Work ordered; and
3. The extent of the adjustment in the Contract Time, if any.

B. A Change Order or Change Directive will become effective when signed by Owner, notwithstanding that Contractor has not signed it. A Change Order will become effective without Contractor's signature, provided Owner indicates same thereon (by indicating it as a "unilateral change order").

C. All changes in any plans and specifications approved by any authority with jurisdiction may also require addenda or change orders approved by that authority.

D. Where Owner requests, a performance bond rider covering the changed Work must be executed and delivered to Owner before proceeding with the changed Work or shortly in time thereafter.

10.03 Procedures And Pricing Of Changed Work

A. Procedures for changed work and pricing of changed work, claims and all forms of extra compensation, are set forth in Section 01 2600 (Modification Procedures).

ARTICLE 11 - TIME ALLOWANCES

11.01 Time Allowances

A. Time is of the essence. Contract Time may only be changed by Change Order, and all time limits stated in the Contract Documents are to mean that time is of the essence.

B. Float. Float shall be treated as a Project resource. Contractor shall not be entitled to a time extension for impacts that consume float, but do not impact the critical path.

C. Time extensions will not be granted unless substantiated by the Critical Path Method **(CPM**) Schedule, and then not until the CPM project float becomes zero. If Contractor fails to submit a TIE within the required time period, then Contractor shall be deemed to have agreed that there is no time impact and that Contractor has irrevocably waived its rights to any additional Contract Time.

11.02 Excusable Delay And Inexcusable Delay Defined.

A. Excusable Delay. Subject to the provisions on Notice of Delay below, Contract Time may be adjusted in an amount equal to the time lost due to:

1. Changes in the Work ordered by Owner (**Changes**");
2. Acts or neglect by Owner, Architect, any Owner Representative, utility owners or other contractors performing other work, not permitted or provided for in the Contract Documents, provided that Contractor has performed its responsibilities under the Contract Documents (including, without limitation, pre-bid investigations) (**Acts or Neglect**); or
3. Fires, floods, epidemics, abnormal weather conditions beyond the parameters otherwise set forth in this Article, earthquakes, civil or labor disturbances, or acts of God (together, "force majeure events"), provided damages resulting therefrom are not the result of Contractor's failure to protect the Work as required by Contract Documents (**Force Majeure**).

B. Inexcusable Delay. Contract Time shall not be extended for any period of time where Contractor (and/or any Subcontractor) is delayed or prevented from completing any part of the Work due to a cause that is within Contractor's risk or responsibility under the Contract Documents. Delays attributable to or within the control of a Subcontractor, or its subcontractors, or supplier, are deemed delays within the control of Contractor.

11.03 Notice Of Delay

A. Within seven Days of the beginning of any delay (excepting adverse weather delays), Contractor shall notify Owner in writing, by submitting a notice of delay that shall describe the anticipated

delays resulting from the delay event in question. If Contractor requests an extension of time, Contractor shall submit a TIE within ten days of the notice of delay. Owner will determine all claims and adjustments in the Contract Time. No claim for an adjustment in the Contract Time will be valid and such claim will be waived if not submitted in accordance with the requirements of this subparagraph. In cases of substantial compliance with the seven-day notice requirement here (but not to exceed twenty-one days from the beginning of the delay event), Owner may in its sole discretion recognize a claim for delay accompanied with the proper TIE, provided Contractor also shows good faith and a manifest lack of prejudice to Owner from the late notice.

11.04 Compensable Time Extensions

A. Subject to other applicable provisions of the Contract Documents, Contractor may be entitled to adjustment in Contract Sum in addition to Contract Time for:

1. Excusable delay caused solely by Changes in the Work ordered by Owner, as provided above, and/or
2. Excusable delay caused solely by Acts or Neglect by Owner or other person, as provided above.

11.05 Non-Compensable Time Extensions

A. Subject to other applicable provisions of the Contract Documents, Contractor may be entitled to adjustment in Contract Time only, without adjustment in Contract Sum, for

1. Periods of excusable delay caused solely by weather or Force Majeure events as provided above in this Article, or
2. Periods of concurrent delay, where delay results from two or more causes, one of which is compensable (resulting from Changes or Acts or Neglect as set forth above in this Article), and the other of which is non-compensable or unexcusable, such as: acts or neglect of Contractor, Subcontractors or others for whom Contractor is responsible; other acts, omissions and conditions which would not entitle Contractor to adjustment in Contract Time; adverse weather; and/or actions of Force Majeure as provided above in this Article.

11.06 Adverse Weather

A. Adverse weather delays may be allowed only if the number of workdays of adverse weather exceeds the parameters listed or referenced immediately below in this subparagraph and Contractor proves that adverse weather actually caused delays to work on the critical path. Contractor shall give written notice of intent to claim an adverse weather day within one Day of the adverse weather day occurring.

B. Claims for extension of time for rain delay will not be granted unless the number of days work is prevented by rain exceeds 100% of the historical average number of rain days for the period of the Contract Time, based on the records of the National Oceanic & Atmospheric Administration (**NOAA**) weather station closest to the Project Site, as measured and reported by NOAA. (For example, for California, Oregon and Washington, these figures are contained in the “>=0.10 inch” column at the applicable weather station’s “General Climate Summary Table” for “Precipitation” at http://www.wrcc.dri.edu/climate-summaries/), pro-rated in the individual month Contractor starts and finishes Work. Delays due to adverse weather conditions will not be allowed for weather conditions that fall within these parameters.

C. In order to qualify as an adverse weather delay with respect to the foregoing parameters, (i.) daily rainfall must exceed 0.1 inch, and/or (ii.) daily snowfall must exceed 1.0 inch or more, at the NOAA station located closest to the Project site, as measured and reported by NOAA. Notwithstanding these allowances, Contractor shall at all times employ all available mitigation measures to enable Work to continue, Contractor shall take reasonable steps to mitigate potential weather delays, such as dewatering the Site, lime treatment, and covering Work and material that could be affected adversely by weather. Failure to do so shall be cause for Owner to not grant a time extension due to adverse weather, where Contractor could have avoided or mitigated the potential delay by exercising reasonable care.

D. Contractor shall include the foregoing precipitation parameters as a monthly activity in its progress schedule. As Work on the critical path is affected by precipitation, Contractor shall notify Owner

and request that the days be moved to the affected activities. Any adverse weather days remaining shall be considered Project float available to either Owner or Contractor.

E. Adverse weather delay for precipitation shall be recognized for the actual period of time Contractor proves it was delayed by precipitation exceeding the specified parameters. For example, and not by way of limitation, if precipitation exceeding the specified parameters does not in fact delay Contractor's progress on the critical path, then no time extension shall be recognized; and conversely, if Contractor proves to Owner's satisfaction that precipitation exceeding the specified parameters causes delay to Contractor for a period longer than the number of precipitation days incurred (e.g., if it rains or snows during grading work), then Contractor shall be entitled to a time extension equal to the actual period of such delay.

F. During unfavorable weather, wet ground, or other unsuitable construction conditions, Contractor shall employ best practices to protect the Work, manage the construction site and rainwater during inclement weather. Persons performing the Work shall examine surfaces to receive their Work and shall report in writing to Contractor, with copy to Owner representative and the Architect conditions detrimental to the Work. Failure to examine and report discrepancies makes the Contractor responsible, at no increase in Contract Sum, for corrections Owner may require. Commencement of Work constitutes acceptance of surface.

11.07 Liquidated Damages

A. Time is of the essence. Execution of Contract Documents by Contractor shall constitute its acknowledgement that Owner will actually sustain damages in the form of Contract administration expenses (such as Project management and consultant expenses) in the amount fixed in the Contract Documents for each and every Day during which completion of Work required is delayed beyond expiration of time fixed for completion plus extensions of time allowed pursuant to provisions hereof.

B. Contractor and Owner agree that because of the nature of the Project, it would be impractical or extremely difficult to fix the amount of such actual damages incurred by Owner because of a delay in completion of all or any part of the Work. Contractor and Owner agree that specified measures of liquidated damages shall be presumed to be the amount of such damages actually sustained by Owner, and that because of the nature of the Project, it would be impracticable or extremely difficult to fix the actual damages.

C. Liquidated damages for delay shall cover administrative, overhead, interest on bonds, and general loss of public use damages suffered by Owner as a result of delay. Liquidated damages shall not cover the cost of completion of the Work, damages resulting from Defective Work, lost revenues or costs of substitute facilities, or damages suffered by others who then seek to recover their damages from Owner (for example, delay claims of other contractors, subcontractors, tenants, or other third-parties), and defense costs thereof. Owner may deduct from any money due or to become due to Contractor subsequent to time for completion of entire Work and extensions of time allowed pursuant to provisions hereof, a sum representing then-accrued liquidated damages.

D. Contractor and Owner agree that the Key Personnel listed in Contractor's Statement of Qualifications (Document 00 4513) were a material factor in Owner's assessment of Contractor's experience and the adequacy of Contactor's supervisory personnel. Accordingly, Contractor and Owner agree that Contractor shall not remove, reassign or make changes to any of the Key Personnel without Owner's prior written approval. In the event that any Key Personnel leaves the Project, is reassigned and/or is removed and replaced by Contractor before Project Final Completion, for any reason whatsoever, Contractor agrees to pay Owner liquidated damages as set forth in the Agreement (Document 00 5200), unless Contractor can demonstrate to Owner's satisfaction that the Key Personnel were reassigned and/or removed and replaced for reasons beyond Contractor's control.

ARTICLE 12 - CLAIMS BY CONTRACTOR

12.01 Obligation to File Claims for Disputed Work

A. Should it appear to Contractor that the Work to be performed or any of the matters relative to the Contract Documents are not satisfactorily detailed or explained therein, or should any questions arise as to the meaning or intent of the Contract Documents, or should any dispute arise regarding

the true value of any work performed, work omitted, extra work that the Contractor may be required to perform, time extensions, payment to the Contractor during performance of this Contract, performance of the Contract, and/or compliance with Contract procedures, or should Contractor otherwise seek extra time or compensation FOR ANY REASON WHATSOEVER, then Contractor shall first follow procedures set forth in the Contract Documents (including, without limitation, Paragraphs 11.03, 11.04, 13.03 and 13.04 of this Document 00 7200 and Section 01 2600.) If a dispute remains, then Contractor shall give written notice to Owner that expressly invokes this Article 12. Owner shall decide the issue in writing within 15 days; and Owner's written decision shall be final and conclusive. If Contractor disagrees with Owner's decision, or if Contractor contends that Owner failed to provide a decision timely, then Contractor's SOLE AND EXCLUSIVE REMEDY is to promptly file a written claim setting forth Contractor's position as required herein.

12.02 Form And Contents Of Claim

A. Contractor's written claim must identify itself as a **"Claim"** under this Article 12 and must include the following: (i) a narrative of pertinent events; (ii) citation to contract provisions; (iii) theory of entitlement; (iv) complete pricing of all cost impacts; (v) a time impact analysis of all time delays that shows actual time impact on the critical path; (vi) documentation supporting items (i) through (v); and (vii) a verification under penalty of perjury of the claim's accuracy. The Claim shall be submitted to Owner within thirty (30) calendar days of receiving Owner's written decision, or the date Contractor contends such decision was due, and shall be priced like a change order according to Section 01 2600, and must be updated monthly as to cost and entitlement if a continuing claim. Routine contract materials, for example, correspondence, RFI, Change Order requests, or payment requests shall not constitute a claim. Contractor shall bear all costs incurred in the preparation and submission of a claim.

12.03 Administration During/After Claim Submission

A. Owner may render a final determination based on the Claim or may in its discretion conduct an administrative hearing on Contractor's claim, in which case Contractor shall appear, participate, answer questions and inquiries, and present any further evidence or analysis requested by Owner prior to rendering a final determination. Should Owner take no action on the Claim within 45 days of submission, it shall be deemed denied.

B. Notwithstanding and pending the resolution of any claim or dispute, Contractor shall diligently prosecute the disputed work to final completion in accordance with Owner's determination.

C. After their submission, claims less than $375,000 shall also be subject to the Local Agency Disputes Act.

12.04 Compliance

A. The provisions of this Article 12 constitute a non-judicial claim settlement procedure that, pursuant to Government Code Section 930.2, shall constitute a condition precedent to submission of a valid Government Code Claim under the Government Code. Contractor shall bear all costs incurred in the preparation, submission and administration of a claim. Any claims presented in accordance with the Government Code must affirmatively indicate Contractor's prior compliance with the claims procedure herein and the previous dispositions under Paragraph 12.03 above of the claims asserted. No suit may be brought against Owner arising out of or in connection with the Project unless and until Contractor presents to Owner a statutory Government Code Claim, in accordance with Government Code Sections 910, *et seq*. Pursuant to Government Code Section 930.2, the one-year period in Government Code section 911.2 shall be reduced to 150 days from either accrual of the cause of action, substantial completion or termination of the contract, whichever occurs first; in all other respects, the Government Code shall apply unchanged.

B. Failure to submit and administer claims as required in Article 12 shall waive Contractor's right to claim on any specific issues not included in a timely submitted claim. Claim(s) or issue(s) not raised in a timely protest and timely claim submitted under this Article 12 may not be asserted in any subsequent litigation, Government Code Claim, or legal action.

C. Owner shall not be deemed to waive any provision under this Article 12, if at Owner's sole discretion, a claim is administered in a manner not in accord with this Article 12. Waivers or

modifications of this Article 12 may only be made a signed change order approved as to form by legal counsel for both Owner and Contractor; oral or implied modifications shall be ineffective.

ARTICLE 13 - UNDERGROUND CONDITIONS

13.01 Contractor To Locate Underground Facilities.

A. During construction, Contractor shall comply with Government Code Sections 4216 to 4216.9, and in particular Section 4216.2 which provides, in part: "Except in an emergency, every person planning to conduct any excavation shall contact the appropriate regional notification center at least two working days, but no more than 14 calendar days, prior to commencing that excavation, if the excavation will be conducted in an area which is known, or reasonably should be known, to contain subsurface installations other than the underground facilities owned or operated by the excavator, and, if practical, the excavator shall delineate with white paint or other suitable markings the area to be excavated. The regional notification center shall provide an inquiry identification number to the person who contacts the center and shall notify any member, if known, who has a subsurface installation in the area of the proposed excavation."

B. Contractor shall contact USA, and schedule the Work to allow ample time for the center to notify its members and, if necessary, for any member to field locate and mark its facilities. Contractor is charged with knowledge of all subsurface conditions reflected in USA records. Prior to commencing excavation or trenching work, Contractor shall provide Owner with copies of all USA records secured by Contractor. Contractor shall advise Owner of any conflict between information provided in Document 00 3132 (Geotechnical Data and Existing Conditions), the Drawings and that provided by USA records. Contractor's excavation shall be subject to and comply with the Contract Documents.

C. Contractor shall also investigate the existence of existing service laterals, appurtenances or other types of utilities, indicated by the presence of an underground transmission main or other visible facilities, such as buildings, new asphalt, meters and junction boxes, on or adjacent to the Site, even if not shown or indicated in Document 00 3132 (Geotechnical Data and Existing Conditions), the Drawings or that provided by USA records. Contractor shall immediately secure all such available information and notify Owner and the utility owner, in writing, of its discovery.

13.02 Contractor To Protect Underground Facilities.

A. At all times during construction, all operating Underground Facilities shall remain in operation, unless the Contract Documents expressly indicate otherwise. Contractor shall maintain such Underground Facilities in service where appropriate; shall repair any damage to them caused by the Work; and shall incorporate them into the Work, including reasonable adjustments to the design location (including minor relocations) of the existing or new installations. Contractor shall take immediate action to restore any in service installations damaged by Contractor's operations.

B. Prior to performing Work at the Site, Contractor shall lay out the locations of Underground Facilities that are to remain in service and other significant known underground installations indicated by the Underground Facilities Data. Contractor shall further locate, by carefully excavating with small equipment, potholing and principally by hand, all such utilities or installations that are to remain and that are subject to damage. If additional utilities whose locations are unknown are discovered, Contractor shall immediately report to Owner for disposition of the same. Additional compensation or extension of time on account of utilities not shown or otherwise brought to Contractor's attention, including reasonable action taken to protect or repair damage, shall be determined as provided in this Document 00 7200.

C. If during construction, an Underground Facility is uncovered or revealed at or contiguous to the Site which was not shown or indicated in the materials supplied by Owner for bidding or in information on file at USA or otherwise reasonably available to Contractor, then Contractor shall, promptly after becoming aware thereof and before further disturbing conditions affected thereby (and in no event later than seven Days), and prior to performing any Work in connection therewith (except in an emergency), identify the owner of such Underground Facility and give written notice to that owner and to Owner. During such time, Contractor shall be responsible for the safety and protection of such Underground Facility.

D. The cost of all of the following will be included in the Contract Sum and Contractor shall have full responsibility for (a) reviewing and checking all available information and data including, without limitation, information made available for bidding and information on file at USA; (b) locating all Underground Facilities shown or indicated in the Contract Documents, available information, or indicated by visual observation including, without limitation, and by way of example only, engaging qualified locating services and all necessary backhoeing and potholing; (c) coordination of the Work with the owners of such Underground Facilities during construction; and (d) the safety and protection of all such Underground Facilities and repairing any damage thereto resulting from the Work.

E. Consistent with Government Code Section 4215, as between Owner and Contractor, Owner will be responsible for the timely removal, relocation, or protection of existing main or trunk line utility facilities located on the Site only if such utilities are not identified in the Contract Documents or information made available for bidding. Owner will compensate for the cost of locating and repairing damage not due to Contractor's failure to exercise reasonable care, removing and relocating such main or trunk line utility facilities not indicated in the Contract Documents or information made available for bidding with reasonable accuracy, and equipment on the Project necessarily idled during such Work. Contractor shall not be assessed liquidated damages for delay in completion of the Project, when such delay was caused by the failure of Owner or the utility to provide for removal or relocation of such utility facilities.

13.03 Concealed Or Unknown Conditions

A. If either of the following conditions is encountered at Site when digging trenches or other excavations that extend deeper than four feet below the surface, Contractor shall give a written Notice of Differing Site Conditions to Owner promptly before conditions are disturbed, except in an emergency as set forth in this Document 00 7200, and in no event later than seven Days after first observance of:

1. Subsurface or Latent physical conditions which differ materially from those indicated in the Contract Documents; or
2. Unknown physical conditions of an unusual nature or which differ materially from those ordinarily encountered and generally recognized as inherent in work of the character provided for in the Contract Documents.

B. In response to Contractor's Notice of Differing Site Conditions under this Paragraph, Owner will investigate the identified conditions, and if they differ materially and cause increase or decrease in Contractor's cost of, or time required for, performance of any part of the Work, Owner will negotiate the appropriate change order following the procedures set forth in the Contract Documents. If Owner determines that physical conditions at the Site are not Latent or are not materially different from those indicated in Contract Documents or that no change in terms of the Contract Documents is justified, Owner will so notify Contractor in writing, stating reasons (with Contractor retaining its rights under Article 12 of this Document 00 7200.)

C. Contractor shall not be entitled to any adjustment in the Contract Sum or Contract Time regarding claimed Latent or materially different Site conditions (whether above or below grade) if Contractor knew or should have known of the existence of such conditions at the time Contractor submitted its Bid, failed to give proper notice, or relied upon information, conclusions, opinions or deductions of the kind that the Contract Documents preclude reliance upon.

D. Regarding Underground Facilities, Contractor shall be allowed an increase in the Contract Sum or an extension of the Contract Time, or both, to the extent that they are attributable to the existence of any Underground Facility that is owned and was built by Owner only where the Underground Facility:

1. Was not shown or indicated in the Contract Documents or in the information supplied for bidding purposes or in information on file at USA; and
2. Contractor did not know of it; and
3. Contractor could not reasonably have been expected to be aware of it or to have anticipated it from the information available. (For example, if surface conditions such as pavement repairs, valve covers, or other markings, indicate the presence of an Underground Facility,

then an increase in the Contract Sum or an extension of the Contract Time will not be due, even if the Underground Facility was not indicated in the Contract Documents, in the information supplied to Contractor for bidding purposes, in information on file at USA, or otherwise reasonably available to Contractor.)

E. Contractor shall bear the risk that Underground Facilities not owned or built by Owner may differ in nature or locations shown in information made available by Owner for bidding purposes, in information on file at USA, or otherwise reasonably available to Contractor. Underground Facilities are inherent in construction involving digging of trenches or other excavations on Owner's Project, and Contractor is to apply its skill and industry to verify the information available.

F. Contractor's compensation for claimed Latent or materially different Site conditions shall be limited to the actual, reasonable, incremental increase in cost of that portion of the Work, resulting from the claimed Latent or materially different Site conditions. Such calculation shall take into account the estimated value of that portion of the Work and the actual value of that portion of the Work, using for guidance Contractor's or its subcontractor's bid amount and actual amounts incurred for that portion of the Work and the reasonable expectation (if any) of differing or difficult site conditions in the Work area based on the available records and locale of the Work. For example, if Contractor excavates in an area unexpected, then such costs would be recoverable entirely; while if Contractor extends an existing excavation, then such costs would be recoverable if the resulting excavation costs in that work area exceeded the reasonable expectations therefore.

13.04 Notice Of Hazardous Waste Or Materials Conditions

A. Contractor shall give a written Notice of Hazardous Materials Condition to Owner promptly, before any of the following conditions are disturbed (except in an emergency as set forth in this Document 00 7200), and in no event later than 24 hours after first observance of any:

1. Material that Contractor believes may be hazardous waste or hazardous material, as defined in Section 25117 of the Health and Safety Code (including, without limitation, Asbestos, lead, PCBs, petroleum and related hydrocarbons, and radioactive material) that is required to be removed to a Class I, Class II, or Class III disposal site in accordance with provisions of existing law (**hazardous material**); or
2. Other material that may present an imminent substantial danger to persons or property exposed thereto in connection with Work at the Site (**other materials**).

B. Except as otherwise provided in the Contract Documents or as provided by applicable law, Contractor shall not be required to give any notice for the disturbance or observation of any such hazardous materials or other materials where such matter is disturbed or observed as part of the scope of Work under the Contract Documents (such as hazardous waste or hazardous material investigation, remediation or disposal activities which are identified as the subject of Work under the Contract Documents), where Contractor complies with all requirements in the Contract Documents and applicable law respecting such materials.

C. Contractor's Notice of Hazardous Materials Condition shall indicate whether the hazardous materials or other materials were shown or indicated in the Contract Documents to be within the scope of Work, and whether the hazardous materials or other materials were brought to the Site by Contractor, its Subcontractors, suppliers, or anyone else for whom Contractor is responsible.

D. Contractor shall not be entitled to any adjustment in the Contract Sum or Contract Time regarding claimed hazardous waste or materials if:

1. Contractor knew of the existence of such hazardous materials or other materials at the time Contractor submitted its Bid; or
2. Contractor should have known of the existence of such hazardous material or other materials as a result of its having the responsibility to obtain additional or supplementary examinations, investigation, explorations, tests, studies, and data concerning the conditions at or contiguous to the Site prior to submitting its Bid; or
3. Contractor failed to give the written notice within the required timeframe set forth below.

E. If Owner determines that conditions involve hazardous materials or other materials and that a change in Contract Document terms is justified, Owner will issue either a Request for Proposal or

Construction Change Directive under the procedures described in the Contract Documents. If Owner determines that conditions do not involve hazardous materials or other materials or that no change in Contract Document terms is justified, Owner will notify Contractor in writing, stating the reasons for its determination.

F. In addition to the parties' other rights under this Document 00 7200, if Contractor does not agree to resume Work based on a reasonable belief that it is unsafe, or does not agree to resume Work under special conditions, Owner may order the disputed portion of Work deleted from the Work, or performed by others, or Owner may invoke its right to terminate Contractor's right to proceed under the Contract Documents in whole or in part, for convenience or for cause as the facts may warrant.

G. If Contractor does not agree with any Owner determination of any adjustment in the Contract Sum or Contract Time under this Article, Contractor may make a claim as provided in Article 12 of this Document 00 7200.

ARTICLE 14 - LEGAL AND MISCELLANEOUS

14.01 Laws And Regulations

A. Contractor shall keep fully informed of and shall comply with all laws, ordinances, regulations and orders of any properly constituted authority affecting the Contract Documents, Work and persons connected with Work, and shall protect and indemnify Owner and its officers, employees, consultants and agents against any claim or liability, including attorney's fees, arising from or based on violation of law, ordinance, regulation or order, whether by Contractor or by Subcontractors, employees or agents. Authorized persons may at any time enter upon any part of Work to ascertain compliance of all applicable laws, ordinances, regulations and orders.

14.02 Permits And Taxes

A. Contractor shall procure all permits and licenses applicable to the Work (including environmental matters to the extent applicable); pay all charges and fees, including fees for street opening permits; comply with, implement and acknowledge effectiveness of all permits; initiate and cooperate in securing all required notifications or approvals therefore; and give all notices necessary and incident to due and lawful prosecution of Work, unless otherwise provided herein. Owner will pay applicable building permits, sanitation and water fees for the completed construction, except as otherwise provided in the Contract Documents. Contractor shall pay all sales and/or use taxes levied on materials, supplies, or equipment purchased and used on or incorporated into Work, and all other taxes properly assessed against equipment or other property used in connection with Work, without any increase in the Contract Sum. Contractor shall make necessary arrangements with proper authorities having jurisdiction over roads, streets, pipelines, navigable waterways, railroads, and other works in advance of operations, even where Owner may have already obtained permits for the Work.

14.03 Communications And Information Distribution

A. All communications recognized under the Contract Documents shall be in writing, in the form of a serialized document, by type of communication. For example, RFI's shall be serialized beginning with RFI No. 1; payment applications shall be serialized beginning with Payment Application No. 1, submittals shall be serialized per specification section and transmitted with transmittal sheets beginning with Transmittal No. 1; and correspondence shall be serialized beginning with letter No. 1. Contractor may propose other record management and identification systems or protocols, intended to facilitate orderly transmittal of project information, storage and retrieval of such information, which Owner will review consistent with these stated objectives, and accept or reject in its sole discretion.

B. Documents Requiring Signatures. All documents requiring signatures for approval prior to implementing action, as stipulated in other portions of Contract Documents, shall require a manually signed, serialized letter delivered to the other party at its address for notice otherwise specified in the Contract Documents, either personally or by mail.

C. Electronic data transfer of such correspondence will serve to expedite preliminary concurrence of information, only. Receipt of "hard copy" signature on forms is required prior to implementing action or work as the conditions may require. For example, change orders and authorizations for extra

cost, require signatures. A party may acknowledge receipt of PDF copies of required correspondence by e-mail, but in the absence of such acknowledgment, mail or personal delivery is required.

D. All emails shall be copied to Owner's and Contractor's Project Representative. Owner reserves the right to preclude e-mail communication, in whole or in part, as Project needs may require. Communication between Owner and Contractor shall not be via Twitter, Facebook, or other types of instant text message systems. Any such communications shall be inadmissible for any purpose related to this Contract.

14.04 Suspension Of Work

A. Owner may, without cause, order Contractor in writing to suspend, delay or interrupt Work in whole or in part for such period of time as Owner may determine. An adjustment shall be made for increases in cost of performance of Work of the Contract Documents caused by any such suspension, delay or interruption, calculated using the measures set forth in Section 01 2600 (Modification Procedures). No adjustment shall be made to extent that performance is, was or would have been so suspended, delayed or interrupted by another cause for which Contractor is responsible.

14.05 Termination Of Contract For Cause

A. The Contractor shall be in default of the Contract Documents and Owner may terminate the Contractor's right to proceed under the Contract Documents, for cause, in whole or in part, should the Contractor commit a material breach of the Contract Documents and not cure such breach within ten (10) calendar days of the date of notice from Owner to the Contractor demanding such cure; or, if such breach is curable but not curable within such ten (10) day period, within such period of time as is reasonably necessary to accomplish such cure. (In order for the Contractor to avail itself of a time period in excess of 10 calendar days, the Contractor must provide Owner within the ten (10) day period with a written plan acceptable to Owner that demonstrates actual resources, personnel and a schedule to promptly to cure said breach, and then diligently commence and continue such cure according to the written plan).

B. In the event of termination by Owner for cause as provided herein, the Contractor shall deliver to Owner possession of the Work in its then condition including, without limitation, all designs, engineering, Project records, cost data of all types, plans and specifications and contracts with vendors and subcontractors, all other documentation associated with the Project, and all construction supplies and aids dedicated solely to performing the Work which, in the normal course of construction, would be consumed or only have salvage value at the end of the construction period. The Contractor shall remain fully liable for the failure of any Work completed and materials and equipment provided through the date of such termination to comply with the provisions of the Contract Documents. The provisions of this Section shall not be interpreted to diminish any right which Owner may have to claim and recover damages for any breach of the Contract Documents or otherwise, but rather, the Contractor shall compensate Owner for all loss, cost, damage, expense, and/or liability suffered by Owner as a result of such termination and/or failure to comply with the Contract Documents.

C. In the event a termination for cause is later determined to have been made wrongfully or without cause, then the termination shall be treated as a termination for convenience, and the Contractor shall have no greater rights than it would have had following a termination for convenience. Any Contractor claim arising out of a termination for cause shall be made in accord with Article 12 herein. No other loss, cost, damage, expense or liability may be claimed, requested or recovered by the Contractor.

14.06 Termination Of Contract For Convenience

A. Owner may terminate performance of the Work under the Contract Documents in accordance with this clause in whole, or from time to time in part, whenever Owner shall determine that termination is in Owner's best interest. Termination shall be effected by Owner delivering to the Contractor notice of termination specifying the extent to which performance of the Work under the Contract Documents is terminated, and the effective date of the termination.

B. Contractor shall comply strictly with Owner's direction regarding the effective date of the termination, the extent of the termination, and shall stop work on the date and to the extent specified.

C. Contractor shall be entitled to a total payment on account of the Contract work so terminated measured by (i.) the actual cost to Contractor of Work actually performed, up to the date of the termination, with profit and overhead limited to twelve percent (12%) of actual cost of work performed, up to but not exceeding the actual contract value of the work completed as measured by the Schedule of Values and Progress Schedule, (ii.) offset by payments made and other contract credits. In connection with any such calculation, however, Owner shall retain all rights under the Contract Documents including, without limitation, claims, indemnities, or setoffs.

D. Under no circumstances may Contractor recover legal costs of any nature, nor may Contract recover costs incurred after the date of the termination.

14.07 Contingent Assignment Of Subcontracts

A. Contractor hereby assigns to Owner each Subcontract for a portion of the Work, provided that:

1. The assignment is effective only after Owner's termination of Contractor's right to proceed under the Contract Documents (or portion thereof relating to that Subcontract) as set forth herein.
2. The assignment is effective only for the Subcontracts which Owner expressly accepts by notifying the Subcontractor in writing;
3. The assignment is subject to the prior rights, if any, of the Surety, obligated by Document 00 6113.13 (Construction Performance Bond) provided under the Contract Documents, where the Surety exercises its rights to complete the Contract;
4. After the effectiveness of an assignment, Contractor shall, at its sole cost and expense (except as otherwise provided in this Document 00 7200), sign all instruments and take all actions reasonably requested by Owner to evidence and confirm the effectiveness of the assignment in Owner; and
5. Nothing in this Paragraph shall modify or limit any of Contractor's obligations to Owner arising from acts or omissions occurring before the effectiveness of any Subcontract assignment including, without limitation, all defense, indemnity and hold-harmless obligations arising from or related to the assigned Subcontract.

14.08 Remedies And Contract Integration

A. Subject to Contract Documents provisions regarding Contractor claims, claim review, and claim resolution, and subject to the limitations therein, the exclusive jurisdiction and venue for resolving all claims, counter claims, disputes and other matters in question between Owner and Contractor arising out of or relating to Contract Documents, any breach thereof or the Project shall be the applicable court of competent jurisdiction located in the State and County where the Project is located. All Owner remedies provided in the Contract Documents shall be taken and construed as cumulative and not exclusive; that is, in addition to each and every other remedy herein provided; and in all instances Owner shall have any and all other equitable and legal rights and remedies which it would have according to law.

B. The Contract Documents, any Contract Modifications and Change Orders, shall represent the entire and integrated agreement between Owner and Contractor regarding the subject matters hereof and thereof and shall constitute the exclusive statement of the terms of the parties' agreement. The Contract Documents, and any Contract Modifications and Change Orders, shall supersede any and all prior negotiations, representations or agreements, written or oral, express or implied, that relate in any way to the subject matter of the Contract Documents or written Modifications. Owner and Contractor represent and agree that, except as otherwise expressly provided in the Contract Documents, they are entering into the Contract Documents and any subsequent written Modification in sole reliance upon the information set forth or referenced in the Contract Documents or Contract Modifications; the parties are not and will not rely on any other information, which shall be inadmissible in any proceeding to enforce these documents.

C. Either party's waiver of any breach or failure to enforce any of the terms, covenants, conditions or other provisions of the Contract Documents at any time shall not in any way affect, limit, modify or

waive that party's right thereafter to enforce or compel strict compliance with every term, covenant, condition or other provision hereof, any course of dealing or custom of the trade or oral representations notwithstanding.

D. Neither acceptance of the whole or any part of Work by Owner nor any verbal statements on behalf of Owner or its authorized agents or representatives shall operate as a waiver or modification of any provision of the Contract Documents, or of any power reserved to Owner herein nor any right to damages provided in the Contract Documents.

14.09 Interpretation.

A. Should any part, term or provision of this Agreement or any of the Contract Documents, or any document required herein or therein to be executed or delivered, be declared invalid, void or unenforceable, all remaining parts, terms and provisions shall remain in full force and effect and shall in no way be invalidated, impaired or affected thereby. If the provisions of any law causing such invalidity, illegality or unenforceability may be waived, they are hereby waived to the end that this Agreement and the Contract Documents may be deemed valid and binding agreements, enforceable in accordance with their terms to the greatest extent permitted by applicable law. In the event any provision not otherwise included in the Contract Documents is required to be included by any applicable law, that provision is deemed included herein by this reference (or, if such provision is required to be included in any particular portion of the Contract Documents, that provision is deemed included in that portion).

B. Contract Documents shall not be construed to create a contractual relationship of any kind between (i) Project Manager or any Owner's representative and Contractor; (ii) Owner and/or its Representatives and a Subcontractor, sub-Subcontractor, or supplier of any Project labor, materials, or equipment; or (iii) between any persons or entities other than Owner and Contractor.

14.010 Patents

A. Fees or claims for any patented invention, article or arrangement that may be used upon or in any manner connected with performance of the Work or any part thereof shall be included in the Bid price for doing the Work. Contractor shall defend, indemnify and hold harmless Owner and each of its officers, employees, consultants and agents including, without limitation, the Board and each Owner's Representative, from all damages, claims for damages, costs or expenses in law or equity, including attorney's fees, arising from or relating to any claim that any article supplied or to be supplied under the Contract Documents infringes on the patent rights, copyright, trade name, trademark, service mark, trade secret or other intellectual property right of any person or persons or that the person or entity supplying the article does not have a lawful right to sell the same. Such costs or expenses for which Contractor agrees to indemnify and hold harmless the above indemnities include but are not limited to any and all license fees, whether such fees are agreed by any indemnitee or ordered by a court or administrative body of any competent jurisdiction.

14.011 Substitution For Patented And Specified Articles

A. Except as noted specifically in the instructions to Bidders or in Contract Documents, whenever in Specifications, material or process is designated by patent or proprietary name or by name of manufacturer, such designation shall be deemed to be used for purpose of facilitating description of material and process desired, and shall be deemed to be followed by the words "or Approved Equal" and Contractor may offer any substitute material or process that Contractor considers "equal" in every respect to that so designated and if material or process offered by Contractor is, in opinion of Owner, Equal in every respect to that so designated, its use will be approved. However, Contractor may utilize this right only by timely submitting Document 00 6325 (Substitution Request Form) as provided in Document 00 2113 (Instructions to Bidders). A substitution will be approved only if it is a true "or equal" item in every aspect of its design and quality including, without limitation, its dimensions, weights, service requirements, durability, functioning, impact on contiguous construction elements, overall schedule and design.

14.012 Interest Of Public Officers

A. No representative, officer, or employee of Owner no member of the governing body of the locality in which the Project is situated, no member of the locality in which Owner was activated, and no

other public official of such locality or localities who exercises any functions or responsibilities with respect to the Project, during the tenure of the official or for one year thereafter, shall, as principal, agent, attorney or otherwise, be directly or indirectly interested, in the Contract Documents or the proceeds thereof.

14.013 Limit Of Liability

A. OWNER, AND EACH OF ITS OFFICERS, BOARD MEMBERS, EMPLOYEES, CONSULTANTS AND AGENTS INCLUDING, WITHOUT LIMITATION, PROJECT MANAGER AND EACH OTHER OWNER REPRESENTATIVE, SHALL HAVE NO LIABILITY TO CONTRACTOR FOR SPECIAL, CONSEQUENTIAL, OR INCIDENTAL DAMAGES, EXCEPT TO THE LIMITED EXTENT THAT THESE CONTRACT DOCUMENTS OR APPLICABLE PUBLIC CONTRACTING STATUTES MAY SPECIFY THEIR RECOVERY.

ARTICLE 15 - WORKING CONDITIONS AND PREVAILING WAGES

15.01 Use Of Site/Sanitary Rules

B. All portions of the Work shall be maintained at all times in neat, clean and sanitary condition. Contractor shall furnish toilets for use of Contractor's and Subcontractors' employees on the Site where needed, and their use shall be strictly enforced. All toilets shall be properly secluded from public observation, and shall be located, constructed and maintained subject to Owner's approval.

C. Contractor shall confine construction equipment, the storage of materials and equipment and the operations of workers to the Site and land areas identified in and permitted by Contract Documents and other land and areas permitted by applicable laws and regulations, rights of way, permits and easements or as designated by Owner, and shall not unreasonably encumber the premises with construction equipment or other materials or equipment. Contractor shall assume full responsibility for any damage to any such land or area, any improvement located thereon, or to Owner or occupant thereof resulting from the performance of Work.

D. During the progress of the Work, Contractor shall keep the Site and the Project free from accumulations of waste materials, rubbish and other debris resulting from the Work. At the completion of the Work, Contractor shall clean the site, remove all waste materials, rubbish and debris from and about the Site as well as all tools, appliances, construction equipment and machinery and surplus materials. Contractor shall leave the premises clean and ready for occupancy by Owner at Substantial Completion of Work. Contractor shall restore to original condition all property not designated for alteration by Contract Documents.

E. Contractor shall not load nor permit any part of any structure or pavement to be loaded in any manner that will endanger the structure or pavement, nor shall Contractor subject any part of Work or adjacent property to stresses or pressures that will endanger it. Contractor shall conduct all necessary existing conditions investigation regarding structural, mechanical, electrical or any other system existing, shall perform Work consistent with such existing conditions, and shall have full responsibility for insufficiencies or damage resulting from insufficiencies of existing systems, equipment or structures to accommodate performing the Work.

15.02 Protection Of Work, Persons, And Property

F. Contractor shall be responsible for initiating, maintaining and supervising all safety and site security precautions and programs in connection with Work, and shall develop and implement a site security and safety plan throughout construction. Contractor shall comply with all safety requirements specified in any safety program established by Owner, or required by state, federal or local laws and ordinances. Contractor shall be responsible for all theft or damage to Work, property or structures, and all injuries to persons, either on the Site or constituting the Work (e.g., materials in transit), arising from the performance of Work of the Contract Documents from a cause.

G. Contractor shall comply with all applicable laws and regulations of any public body having jurisdiction for safety of persons or property or to protect them from damage, injury or loss; and shall erect and maintain all necessary safeguards for such safety and protection. Contractor shall notify Owners of adjacent property and of Underground Facilities and utility Owners when prosecution of the Work may affect them, and shall cooperate with them in the protection, removal, relocation and replacement of their property.

H. Contractor shall remedy all damage, injury or loss to any property referred to above in this Article, caused, directly or indirectly, in whole or in part, by Contractor, any Subcontractor, supplier, or any other person or organization directly or indirectly employed by any of them to perform or furnish any Work or anyone for whose acts any of them may be liable. Contractor's duties and responsibility for safety and for protection of Work shall continue until such time as all the Work is completed and Final Acceptance of the Work. Owner and its agents do not assume any responsibility for collecting any indemnity from any person or persons causing damage to Contractor's Work.

I. Contractor shall designate a qualified and experienced safety representative at the Site whose duties and responsibilities shall be the prevention of accidents and the maintaining and supervising of safety precautions and programs.

J. Owner may, at its option, retain such moneys due under the Contract Documents as Owner deems necessary until any and all suits or claims against Contractor for injury to persons or property shall be settled and Owner receives satisfactory evidence to that effect.

K. Work within the right-of-way lines of the city/town and/or State shall be done in accordance with the standards and specifications of the controlling agency. Permit for such work shall be obtained and paid for by the Contractor before executing the work within such right-of-ways.

15.03 Responsibility For Safety And Health

L. Contractor shall ensure that its and each tier of Subcontractors' employees, agents and invitees comply with applicable health and safety laws while at the Site. These laws include the Occupational Safety and Health Act of 1970 and rules and regulations issued pursuant thereto, and Owner's safety regulations as amended from time to time. Contractor shall comply with all Owner directions regarding protective clothing and gear.

M. Contractor shall be fully responsible for the safety of its and its Subcontractors' employees, agents and invitees on the Site. Contractor shall notify Owner, in writing, of the existence of hazardous conditions, property or equipment at the Site that are not under Contractor's control. Contractor shall be responsible for taking all the necessary precautions against injury to persons or damage to the property of Contractor, Subcontractors or persons from recognized hazards until the responsible party corrects the hazard.

N. Contractor shall confine all persons acting on its or its Subcontractors' behalf to that portion of the Site where Work under the Contract Documents is to be performed, Owner-designated routes for ingress and egress thereto, and any other Owner-designated area. Except those routes for ingress and egress over which Contractor has no right of control, within such areas, Contractor shall provide safe means of access to all places at which persons may at any time have occasion to be present.

15.04 Emergencies

O. In emergencies affecting the safety or protection of persons or Work or property at the Site or adjacent thereto, Contractor, without special instruction or authorization from Owner, is obligated to act to prevent threat and damage, injury or loss, until directed otherwise by Owner. Contractor shall give Owner prompt written notice if Contractor believes that any significant changes in Work or variations from Contract Documents have been caused thereby. If Owner determines that a change in the Contract Documents is required because of the action taken by Contractor in response to such an emergency, a Change Order or Construction Change Directive will be issued to document the consequences of such action.

15.05 Use Of Roadways And Walkways

P. Contractor shall not unnecessarily interfere with use of any roadway, walkway or other facility for vehicular or pedestrian traffic. Before beginning any interference and only with Owner's prior concurrence, Contractor may provide detour or temporary bridge for traffic to pass around or over the interference, which Contractor shall maintain in satisfactory condition as long as interference continues. Unless otherwise provided in the Contract Documents, Contractor shall bear the cost of these temporary facilities.

15.06 Nondiscrimination

Q. No person or entity shall discriminate in the employment of persons upon public works because of race, religious creed, color, national origin, ancestry, physical disability, mental disability, medical condition, marital status, sexual preference, or gender of such persons, except as provided in Government Code Section 12940. Every contractor for public works violating the provisions of Labor Code Section 1735 is subject to all the penalties imposed for a violation of Chapter 1, Part 7, Division 2 of the California Labor Code.

15.07 Prevailing Wages And Working Hours

R. Contractor shall pay to persons performing labor in and about Work provided for in the Contract Documents an amount equal to or more than the general prevailing rate of per diem wages for (i) work of a similar character in the locality in which the Work is performed and (ii) legal holiday and overtime work in said locality. The per diem wages shall be an amount equal to or more than the stipulated rates contained in a schedule that has been ascertained and determined by the Director of the State Department of Industrial Relations and Owner to be the general prevailing rate of per diem wages for each craft or type of workman or mechanic needed to execute this Contract. Contractor shall also cause a copy of this determination of the prevailing rate of per diem wages to be posted at each Site.

S. Contractor shall forfeit, as a penalty to Owner, $200.00 for each laborer, worker, or mechanic employed in performing labor in and about the Work provided for in the Contract Documents for each Day, or portion thereof, that such laborer, worker or mechanic is paid less than the said stipulated rates for any Work done under the Contract Documents by him or her or by any Subcontractor under him or her, in violation of Articles 1 and 2 of Chapter 1 of Part 7 of Division II of the Labor Code. The sums and amounts that are forfeited pursuant to this Paragraph and the terms of the Labor Code shall be withheld and retained from payments due to Contractor under the Contract Documents, pursuant to this Document 00 7200 and the Labor Code, but no sum shall be so withheld, retained or forfeited except from the final payment without a full investigation by either the State Department of Industrial Relations or by Owner. The Labor Commissioner pursuant to Labor Code Section 1775 shall determine the final amount of forfeiture.

T. Contractor shall insert in every subcontract or other arrangement which Contractor may make for performance of Work or labor on Work provided for in the Contract, provision that Subcontractor shall pay persons performing labor or rendering service under subcontract or other arrangement not less than the general prevailing rate of per diem wages for work of a similar character in the locality in which the Work is performed, and not less than the general prevailing rate of per diem wages for holiday and overtime work fixed in the Labor Code.

U. Contractor stipulates that it shall comply with all applicable wage and hour laws, including without limitation, Labor Code Sections 1776 and 1810-1815. Failure to so comply shall constitute a default under this Contract.

V. Contractor and its Subcontractors shall be responsible for compliance with Labor Code Sections 1810-1815.

1. Eight hours of labor performed in execution of the Contract constitutes a legal day's work. The time of service of any worker employed on the Project is limited and restricted to 8 hours during any one calendar day, and 40 hours during any one calendar week.
2. Contractor and its Subcontractors shall keep an accurate record showing the name of and actual hours worked each calendar day and each calendar week by each worker employed by him or her in connection with the Project. The record shall be kept open at all reasonable hours to the inspection Owner and to the Division of Labor Standards Enforcement.
3. Contractor or its Subcontractors shall, as a penalty to Owner, forfeit twenty-five dollars ($25) for each worker employed in the execution of the Contract Documents by the respective Contractor or Subcontractor for each calendar day during which the worker is required or permitted to work more than 8 hours in any one calendar day and 40 hours in any one calendar week in violation of the provisions of Labor Code Sections 1810-1815.
4. Work performed on the Project by employees of Contractor or its Subcontractors in excess of 8 hours per day, and 40 hours during any one week, shall be permitted upon compensation for all hours worked in excess of 8 hours per day at not less than 1 1/2 times the basic rate of pay.

W. Contractor and its Subcontractors shall be responsible for compliance with Labor Code Section 1776. Further, if this Contract is awarded on or after January 1, 2015, this Project is subject to prevailing wage compliance monitoring and enforcement by the Department of Industrial Relations.

1. Contractor and Subcontractors must keep accurate payroll records, showing the name, address, social security number, work classification, straight time and overtime hours worked each day and week, and the actual per diem wages paid to each journeyman, apprentice, worker, or other employee employed by him or her in connection with the Work of the Contract Documents. Each payroll record shall contain or be verified by a written declaration as required by Labor Code Section 1776.
2. The payroll records enumerated above must be certified and shall be available for inspection at all reasonable hours at the principal office of the Contractor as required by Labor Code Section 1776.

    a. Contractor shall inform Owner of the location of records enumerated above, including the street address, city/town and county, and shall, within five working days, provide a notice of a change of location and address.
    b. Contractor or Subcontractor has 10 days in which to comply subsequent to receipt of a written notice requesting the records enumerated above. In the event that the Contractor or Subcontractor fails to comply with the ten-day period, he or she shall, as a penalty to Owner on whose behalf the contract is made or awarded, forfeit $100.00 for each calendar day, or portion thereof, for each worker, until strict compliance is effectuated. Upon the request of the Division of Apprenticeship Standards or the Division of Labor Standards Enforcement, these penalties shall be withheld from progress payments then due. Contractor is not subject to a penalty assessment pursuant to this Paragraph due to the failure of a Subcontractor to comply with this Paragraph.

3. With each application for payment, Contractor shall also deliver certified payrolls to Owner as set forth above in this Document 00 7200 (General Conditions), and (if this Contract is awarded on or after April 1, 2015 or continues on or after January 1, 2016, or the Labor Commissioner otherwise directs) concurrently therewith (but in no event less frequently than monthly) directly to the Labor Commissioner in the format prescribed by the Labor Commissioner.
4. Contractor shall post all jobsite notices if and when prescribed by regulation.

15.08 Environmental Controls

X. Contractor shall comply with all rules, regulations, ordinances, and statutes that apply to any Work performed under the Contract Documents including, without limitation, any toxic, water, stormwater management and soil pollution controls and air pollution controls specified in Government Code Section 11017. Contractor shall be responsible for insuring that Contractor's Employees, Subcontractors, and the public are protected from exposure to airborne hazards or contaminated water, soil, or other toxic materials used during or generated by activities on the Site or associated with the Project.

15.09 Shoring Safety Plan

Y. Any conflict between this Paragraph and the Technical Specifications shall be resolved in favor of the most stringent requirement.

Z. At least five Days in advance of any excavation five feet or more in depth, Contractor shall submit to Owner a detailed plan showing the shoring, bracing and sloping design (including calculations) and other provisions to be made for worker protection from the hazard of caving ground during the excavation, as required by Labor Code Section 6705. A civil or structural engineer registered in California shall prepare and sign any plan that varies from the shoring system standards established by the State Construction Safety Orders.

AA. During the course of Work, Contractor shall be responsible for determining where sloping, shoring, and/or bracing is necessary and the adequacy of the design, installation, and maintenance of all shoring and bracing for all excavation, including any excavation less than five feet in depth.

Contractor will be solely responsible for any damage or injuries that may result from excavating or trenching. Owner's acceptance of any drawings showing the shoring or bracing design or Work schedule shall not relieve Contractor of its responsibilities under this Paragraph.

BB. Appoint a qualified supervisory employee who shall be responsible to determine the sloping or shoring system to be used depending on local soil type, water table, stratification, depth, etc.

END OF DOCUMENT

DOCUMENT 00 7316

SUPPLEMENTARY CONDITIONS – INSURANCE AND INDEMNIFICATION

ARTICLE 1 INSURANCE

1.01 At or before the date specified in Document 00 2113 (Instructions to Bidders), Contractor shall furnish to Owner satisfactory proof that Contractor has taken out for the entire period covered by the Contract the following classes of insurance in the form and with limits and deductibles specified below, unless otherwise specified in Contract Documents:

A. Comprehensive General Liability Insurance covering claims for personal injury, bodily injury and property damage arising out of the Work and in a form providing coverage not less than that of a Standard Commercial General Liability Insurance policy (**Occurrence Form**). Such insurance shall provide for all operations and include independent contractors, products liability, completed operations for one year after Final Completion and acceptance of the final payment for the Work, contractual liability, and coverage for explosion, collapse, and underground hazards. The limits of such insurance shall not be coverage of less than **[$5,000,000]** each occurrence, **[$5,000,000]** general aggregate limit, and **[$5,000,000]** aggregate for products and completed operations. The policy shall be endorsed to provide Broad Form Property Damage Coverage.\

B. Comprehensive Automobile Liability Insurance covering all owned, non-owned, and hired vehicles. Such insurance shall provide coverage not less than the standard Comprehensive Automobile Liability policy with limits not less than **[$2,000,000]** each person Bodily Injury, **[$2,000,000]** each occurrence Bodily Injury, and **[$2,000,000]** each occurrence Property Damage.

C. All-Risk Course of Construction Insurance including damage to property owned by Owner, Contractor or third parties caused by fire. Insurance shall be in the amount of 100 percent of the completed value of the Work to be performed under this Contract. Deductible shall not exceed **[$10,000.00].** Each loss shall be borne by Contractor.

D. Workers' Compensation Insurance for all persons whom the Contractor may employ in carrying out Work contemplated under Contract Documents, in accordance with the Act of Legislature of State of California, known as "Workers' Compensation Insurance and Safety Act," approved May 26, 1913, and all acts amendatory or supplemental thereto, in the statutory amount.

E. Environmental Impairment Liability Insurance covering bodily injury and property damage utilizing an occurrence policy form, in an amount no less than **[$1,000,000]** combined single limit for each occurrence.

1.02 If Contractor normally carries insurance in an amount greater than the minimum amounts required by Owner in Paragraph 1.01 above, that greater amount shall become the minimum required amount of insurance for purposes of the Contract. Therefore, Contractor hereby acknowledges and agrees that all insurance carried by it shall be deemed liability coverage for all actions it performs in connection with the Contract. .

The limits of insurance this Contract requires may be satisfied by a combination of primary and umbrella or excess insurance. Any umbrella or excess insurance shall contain or be endorsed to contain a provision that such coverage shall also apply on a primary and non-contributory basis for the Owner's benefit, to the extent required by the Contract, before the Owner's insurance or self-insurance may be called upon to protect Owner as a named insured.

1.03 All policies of insurance shall be placed with insurers acceptable to Owner. The insurance underwriter(s) for all insurance policies except Workers' Compensation shall have an A. M. Best Company rating of [A-, VIII] or better, unless otherwise specified in Contract Documents. Required minimum amounts of insurance may be increased should conditions of Work, in opinion of Owner, warrant such increase. Contractor shall increase required insurance amounts upon direction by Owner.

All self-insured retentions (SIR) must be disclosed to the Owner for approval and shall not reduce the coverage limits. Insurance policies containing an SIR provision shall provide or be endorsed to provide that the SIR may be satisfied by either the named Contractor/named insured or the Owner.

1.04 Required Endorsements: The policies required under Document 00 7200 (General Conditions) and this Document 00 7316 (including any umbrella or excess liability policy(ies)) shall be endorsed as follows:

A. Name Owner, its elected and/or appointed governing body and boards, employees, representatives, consultants, and agents, and Project Manager as additional insureds, but only with respect to liability arising out of the activities of the named insured. Additional insured language must be at least as broad as the Insurance Services Office (**ISO**) forms GC 20 38 04 13 and GC 20 37 04 13.

B. Each such policy shall apply separately to each insured against whom claim is made or suit is brought, except with respect to the limit of the insurance company's liability required hereunder. Should any of the policies identified herein contain a "cross-suits" exclusion, such exclusion must not apply to any additional insureds.

C. Insurance shall be primary to Owner and no other insurance or self-insured retention carried or held by Owner shall be called upon to contribute to a loss covered by insurance for the named insured.

D. All endorsements shall include the applicable policy number, the named insured(s) and policy terms.

E. Contractor or its insurance broker shall submit to Owner a copy of the "**Declarations Page**" for each policy identified under Paragraph 1.01 above. The Declarations Page shall include the name of the insurance carrier, the applicable policy number, the types of coverage and limits of insurance provided, the effective date(s) of the policy, the insurance broker's name and license number, and a list of all coverage forms and endorsements.

1.05 Certificates of insurance and endorsements shall have clearly typed thereon Owner Contract Number and title of Contract Documents. Written notice of cancellation, non-renewal, or reduction in coverage of any policy shall be mailed to Owner (Attention: Owner Risk Manager / Purchasing Agent) at the address listed in Document 00 5200 (Agreement), 60 Days in advance of the effective date of the cancellation, non-renewal, or reduction in coverage. Written notice of cancellation for non-payment shall be mailed within 10 Days of cancellation. Contractor shall maintain all insurance in full force and effect during entire period of performance of Contract Documents, including warranty and guarantee periods. However, Contractor may discontinue All-Risk Course of Construction Insurance after Final Payment, and shall maintain General Liability Insurance throughout the entire Extended Term specified Paragraph 1.01 above. At time of making application for extension of time, and during all periods exceeding the Contract Time resulting from any cause, Contractor shall submit evidence that insurance policies will be in effect during requested additional period of time. Upon Owner's request, Contractor shall submit to Owner, within 30 Days, copies of the actual insurance policies or renewals or replacements.

1.06 Contractor shall pay all insurance premiums, including any charges for required waivers of subrogation or the endorsement of additional insureds. If Contractor fails to maintain insurance, Owner may take out comparable insurance, and deduct and retain amount of premium from any sums due Contractor under Contract Documents, or require Contractor to reimburse Owner.

1.07 If injury occurs to any employee of Contractor, Subcontractor or sub-subcontractor for which the employee, or the employee's dependents in the event of employee's death, is entitled to compensation from Owner under provisions of the Workers' Compensation Insurance and Safety Act, as amended, or for which compensation is claimed from Owner, Owner may retain out of sums due Contractor under Contract Documents, amount sufficient to cover such compensation, as fixed by the Act, as amended, until such compensation is paid, or until it is determined that no compensation is due. If Owner is compelled to pay compensation, Owner may, in its discretion,

either deduct and retain from the Contract Sum the amount so paid, or require Contractor to reimburse Owner.

1.08 Nothing herein shall be construed as limiting in any way the extent to which Contractor or any Subcontractor may be held responsible for payment of damages resulting from their operations.

1.09 Except for Comprehensive General Liability Insurance, of which Subcontractors need only obtain $1,000,000 in coverage, all Subcontractors shall maintain the same insurance required to be maintained by Contractor with respect to their portions of the Work unless otherwise indicated in Contract Documents, and Contractor shall cause the Subcontractors to furnish proof thereof to Owner within ten Days of Owner's request.

1.10 The following provisions apply to any licensed professional engaged by Contractor to perform portions of the Work (Professional).

A. Each Professional shall maintain the following insurance, unless otherwise specified in Contract Documents:

B. Professional Liability Insurance, insuring against professional errors and omissions arising from Professional's Work on the Project, in an amount not less than **[$1,000,000]** combined single limit for each occurrence. If Professional cannot provide an occurrence policy, Professional shall provide insurance covering claims made as a result of performance of Work on this Project and shall maintain such insurance in effect for not less than two years following Final Completion of the Project.

1. Professional shall satisfy all other provisions of this Document 00 7316 relating to that insurance, including without limitation providing required insurance certificates (containing the required endorsements) before commencing its Work on the Project.

1.11 Contractor shall maintain insurance as required by this Agreement to the fullest amount allowed by law and shall maintain insurance for a minimum of five (5) years following completion of this project or service. In the event Contractor fails to obtain or maintain completed operations coverage as required by this Agreement, Owner at its sole discretion may purchase the coverage required and the cost will be paid by Contractor.

ARTICLE 2 RESPONSIBILITY OF CONTRACTOR AND INDEMNIFICATION

2.01 Owner and each of its officers, employees, consultants and agents including, without limitation, the Board, Project Manager and each Owner's Representative, shall not be liable or accountable in any manner for loss or damage that may happen to any part of the Work; loss or damage to materials or other things used or employed in performing the Work; injury, sickness, disease, or death of any person; or damage to property resulting from any cause whatsoever except their sole negligence, willful misconduct or active negligence, attributable to performance or character of the Work, and Contractor releases all of the foregoing persons and entities from any and all such claims.

2.02 To the furthest extent permitted by law (including, without limitation, Civil Code Section 2782), Contractor shall defend, indemnify, and hold harmless, Owner and each of its officers, employees, consultants and agents including, without limitation, the Board, Project Manager and each Owner's Representative, from claims, suits, actions, losses and liability of every kind, nature and description including, without limitation, claims and fines of regulatory agencies and attorney's fees and consultant's fees, directly or indirectly arising out of, connected with, or resulting from performance of the Work, failure to perform the Work, or condition of the Work that is caused in whole or part by any act or omission of Contractor, Subcontractors, anyone directly or indirectly employed by any of them, or anyone for whose acts any of them may be liable, resulting from any cause whatsoever except their sole negligence, willful misconduct, or active negligence.

2.03 With respect to third-party claims against Contractor, Contractor waives any and all rights to any type of express or implied indemnity including, without limitation, costs of defense, against Owner and each of its officers, employees, consultants and agents including, without limitation, Owner, the Board, Project Manager and each Owner's Representative. Owner shall provide timely notice

to Contractor of any third-party claim relating to the Contract Documents, in accordance with Public Contract Code Section 9201.

2.04 Approval or purchase of any insurance contracts or policies shall in no way relieve from liability nor limit the liability of Contractor, its Subcontractors of any tier, or the officers or agents of any of them. The Contractor's defense and indemnification obligations are undertaken in addition to, and shall not in any way be limited by, the insurance obligations contained herein.

2.05 To the furthest extent permitted by law (including, without limitation, Civil Code §2782), the indemnities, releases of liability and limitations of liability, claims procedures, and limitations of remedy expressed throughout Contract Documents shall apply even in the event of breach of Contract, negligence (active or passive), fault or strict liability of the party(ies) indemnified, released, or limited in liability, and shall survive the termination, rescission, breach, abandonment, or completion of the Work or the terms of the Contract Documents. If Contractor fails to perform any of these defense or indemnity obligations, Owner may in its discretion back charge Contractor for Owner's costs and damages resulting therefrom and withhold such sums from progress payments or other Contract moneys which may become due.

2.06 Contractor's obligations to defend and indemnify Owner shall survive the termination or completion of this Contract for the full period of time allowed by law.

END OF DOCUMENT

DOCUMENT 00 7380

APPRENTICESHIP PROGRAM

ARTICLE 1 COMPLIANCE REQUIRED

1.01 Contractor and Subcontractors shall comply with the requirements of California Labor Code Sections 1776, 1777.5, and 1777.6 concerning the employment of apprentices by Contractor or Subcontractors. Willful failure to comply may result in penalties, including loss of the right to Bid on or receive public works contracts.

ARTICLE 2 CERTIFICATION OF APPROVAL

2.01 California Labor Code Section 1777.5, as amended, requires a Contractor or Subcontractor employing tradespersons in any apprenticeable occupation to apply to the joint apprenticeship committee nearest the site of a public works project and which administers the apprenticeship program in that trade for a certification of approval. The certificate shall also fix the ratio of apprentices to journeypersons that will be used in performance of the Contract. The ratio of work performed by apprentices to journeypersons in such cases shall not be less than one *hour* of apprentices work for every five *hours* of labor performed by journeypersons (the minimum ratio for the land surveyor classification shall not be less than one apprentice for each five journeypersons), except:

A. When unemployment for the previous three month period in the area exceeds an average of 15 percent;

B. When the number of apprentices in training in the area exceeds a ratio of one to five;

C. When a trade can show that it is replacing at least 1/30 of its membership through apprenticeship training on an annual basis state-wide or locally; or

D. Assignment of an apprentice to any work performed under a public works contract would create a condition which would jeopardize his or her life or the life, safety, or property of fellow employees or the public at large or if the specific task to which the apprentice is to be assigned is of such a nature that training cannot be provided by a journeyperson.

ARTICLE 3 FUND CONTRIBUTIONS

3.01 Contractor is required to make contributions to funds established for administration of apprenticeship programs if Contractor employs registered apprentices or journeypersons in any apprenticeable trade on such contracts and if other contractors on the public works site are making such contributions.

ARTICLE 4 APPRENTICESHIP STANDARDS

4.01 Information relative to apprenticeship standards, wage schedules, and other requirements may be obtained from the Director of the California Department of Industrial Relations, or from the Division of Apprenticeship Standards and its branch offices.

END OF DOCUMENT

DOCUMENT 00 9113

ADDENDA

COASTSIDE FIRE PROTECTION DISTRICT

Fire Station #44 Replacement Project
501 Stetson Street, Moss Beach, CA 94038

[DOCUMENT TO BE COMPLETED AS ADDENDA DURING BID PERIOD]

The Addenda if any will be issued during the bid period and will be made a part of this contract.

(Addenda have been incorporated into the conformed Project Manual.)

END OF DOCUMENT

DIVISION 1 GENERAL REQUIREMENTS

SECTION 01 1100

SUMMARY

PART 1 GENERAL

1.01 Summary.

A. Section includes Summary of Work and Work Restrictions including:

1. Work Covered By Contract Documents
2. Bid Item, Allowances and Alternates
3. Specialty Items
4. Work Under Other Contracts
5. Future Work
6. Work Sequence
7. Work Days and Hours
8. Shutdown for Discovery of Cultural Resources
9. Cooperation of Contractor and Coordination with Other Work
10. Partial Occupancy/Utilization Requirements
11. Contractor Use of Site
12. Air Quality Standards
13. Construction Staking and Monument Protection
14. Protection of Existing Structures and Underground Facilities
15. Permits
16. Owner-Furnished Products

1.02 Work Covered by Contract Documents.

A. Work comprises of the construction of Owner's **Fire Station #44 Replacement Project** located at **501 Stetson Street, Moss Beach, CA 94038.** Contract Documents fully describe the Work.

B. The Work of this Contract comprises construction of all the Work indicated, described in the Specifications, or otherwise required by the Contract Documents. Unless provided otherwise in the Contract Documents, all risk of loss to Work covered by Contract Documents shall rest with Contractor until Final Acceptance of the Work. Cost of maintenance of systems and equipment prior to Final Acceptance will be considered as included in prices Bid and no direct or additional payment will be made therefore.

C. For all Bid items, furnish and install all Work, including connections to existing systems, indicated and described in Specifications and all other Contract Documents. Work and requirements applicable to each individual Bid item, or unit of Work, shall be deemed incorporated into the description of each Bid item (whether Lump Sum or Unit Price). Any Bid item may be deleted from the Work and Contract Sum, in total or in part, prior to or after award of Contract without compensation in any form or adjustment of other Bid items or prices therefore.

D. Allowance Work shall be done as Change Orders and as specified in Section 01 2600 (Modification Procedures). Identify Allowance Items (See Document 00 4113 [Bid Form]) work on the Progress Schedules and on Applications for Payment. The Amount given on Document 00 4113 (Bid Form) under each Allowance Item is the sum of money set aside for each Allowance Item. These amounts shall be included in the Contract Sum on the Bid Form. If the cost of Work done under any Allowance Item is less than the amount given on the Bid Form under that Allowance Item, the Contract Sum shall be reduced by the difference between the amount given in the Bid Form and the cost of Work actually done.

1.03 Bid Items, Allowances and Alternates.

A. Descriptions of Lump Sum Items (listed by Bid item numbers): Work listed in bid schedule shall be all work shown and described in the Plans and Specifications.

B. Descriptions of Unit Price Items and Basis of Measurement for Payment (listed by Bid item numbers): N/A

C. Allowances: (N/A)

1. Scope of Allowances: (N/A)

D. Bid Alternates: (N/A)

1.04 Specialty Items.

A. Specialty Items: (N/A)

1.05 Work Under Other Contracts. (N/A)

1.06 Future Work. (N/A)

1.07 Work Sequence. (N/A)

1.08 Work Days and Hours.

A. Work Days and hours: Monday-Friday inclusive, **8:00 a.m.-5:00 p.m.** local time.

B. Work at the Site on weekends or holidays is not permitted, unless Contractor requests otherwise from Owner in writing at least 48 hours in advance and Owner approves in its sole discretion.

1.09 Shutdown for Discovery of Cultural Resources.

A. If discovery is made of items of historical archaeological or paleontological interest, immediately cease all Work in the area of discovery. Archaeological indicators may include, but are not limited to, dwelling sites, locally darkened soils, stone implements or other artifacts, fragments of glass or ceramics, animal bones, human bones, and fossils. After cessation of excavation, immediately contact Owner. Do not resume Work until authorization is received from Owner. When resumed, excavation or other activities shall be as directed by Owner.

1.10 Cooperation of Contractor and Coordination with Other Work.

A. Coordinate with Owner and any Owner forces, or other contractors and forces, as required by Document 00 7200 (General Conditions).

B. Employ a full-time coordinator to constantly review Contract Documents, submittals, changes, and prepare overlay drawings as necessary to avoid conflicts, errors, omissions and untimely construction.

1.11 Partial Occupancy/Utilization Requirements.

A. Allow Owner to take possession of and use any completed or partially completed portion of the Work during the progress of the Work as soon as is possible without interference to the Work.

B. Possession, use of Work, and placement and installation of equipment by Owner shall not in any way evidence the completion of the Work or any part of it.

C. Contractor shall not be held responsible for damage to the occupied part of the Work resulting from Owner occupancy.

D. Make available, in areas occupied, on a 24 hour per day and 7 day per week basis if required, any utility services, heating, and cooling in condition to be put in operation at the time of occupancy.

1. Responsibility for operation and maintenance of said equipment shall remain with Contractor.
2. Make, and Owner shall certify, an itemized list of each piece of equipment so operated with the date operation commences.
3. Itemized list noted above shall be basis for commencement of warranty period for equipment.

4. Owner shall pay for utility cost arising out of occupancy by Owner during construction.

E. Use and occupancy by Owner prior to acceptance of Work does not relieve Contractor of its responsibility to maintain insurance and bonds required under the Contract until entire Work is completed and accepted by Owner.

F. Prior to date of Final Acceptance of the Work by Owner, all necessary repairs or renewals in Work or part thereof so used, not due to ordinary wear and tear, but due to Defective materials or workmanship or to operations of Contractor, shall be made at expense of Contractor, as required in Document 00 7200 (General Conditions).

G. Use by Owner of Work or part thereof as contemplated by this Section 01 1100 shall in no case be construed as constituting acceptance of Work or any part thereof. Such use shall neither relieve Contractor of any responsibilities under Contract, nor act as waiver by Owner of any of the conditions thereof.

H. Owner may specify in the Contract Documents that portions of the Work, including electrical and mechanical systems or separate structures, shall be substantially completed on dates described in this Section 01 1100, if any, prior to Substantial Completion of all of the Work. Notify Owner in writing when Contractor considers any such part of the Work ready for its intended use and Substantially Complete and request Owner to issue a Certificate of Substantial Completion for that part of the Work.

1.12 Contractor Use of Site.

A. Access is available to the Site from **Stetson Street** along the route indicated.

B. Confine operations at Site to areas permitted by Contract Documents, permits, ordinances, and laws. Do not unreasonably encumber Site with materials or equipment.

C. Assume full responsibility for protection and safekeeping of products stored on premises. Move any stored products that interfere with operations of Owner or other contractor.

D. Coordinate parking, storage, staging, and Work areas with Owner. Owner will provide a storage area for Contractor's equipment and materials. Do not store construction materials in the dripline of any tree.

E. Prior to commencement of Work or excavation, Contractor and Owner shall jointly survey the area adjacent to the Project area making permanent note and record of such existing damage such as cracks, sags or other similar damage. This record shall serve as a basis for determination of subsequent damage to structures, conditions or other existing improvements due to Contractor’s operations. All parties making the survey shall sign the official record of existing damage. Cracks, sags or damage of any nature to the adjacent Project area, not noted in the original survey but subsequently noted, shall be reported immediately to Owner.

F. The Contractor shall follow all local ordinances in force during the duration of this Contract.

G. It is essential that the Contractor perform the Work with as little interference and disturbance as possible to the surrounding neighborhood.

H. When suspect materials, outside the scope of Work, are encountered during the Work or restoration process, the Contractor shall immediately contact the Project Manager for evaluation and approval of the methods for dealing with the material.

1.13 Air Quality Standards.

A. Ensure that idling time for all heavy equipment is minimized to reduce on-Site emissions.

B. Maintain equipment in good mechanical condition.

C. Cover trucks hauling dirt.

D. Limit dust emissions during periods of high winds (greater than 15 miles per hour).

E. Replace ground cover in disturbed areas as soon as possible.

F. Enclose, cover, water, or apply soil binders to exposed stockpiles.

G. Remove earth tracked onto neighboring paved roads at least once daily.

H. Limit equipment speed to 10 miles per hour in unpaved areas.

1.14 Construction Staking and Monument Protection.

A. Notify Owner 3 Business Days prior to the need for initial staking. Owner will provide engineering surveys to establish construction stakes that in Owner's judgment are necessary to enable Contractor to proceed with the Work.

B. If Contractor finds any additional staking necessary, notify Owner in writing 2 Business Days in advance. Owner shall have no liability for any inadequacy unless Contractor notifies Owner and Owner fails to cure within 3 Business Days of such notice.

C. Contractor shall be responsible for laying out the Work, shall protect and preserve the established construction stakes and property monuments, and shall make no changes or relocations without the prior written approval of Owner. Whenever Contractor knows or reasonably should know that any Work activity is likely to damage or destroy any construction stakes or property monuments, or require relocation because of necessary changes in grades or locations, provide at least 2 Business Days advance notice to Owner. In any event, notify Owner whenever any construction stakes or property monuments are lost or destroyed or require relocation because of necessary changes in grades or locations. Owner shall replace or repair construction stakes or property monuments at Contractor's expense.

D. Perform brush clearing and traffic control, as necessary, in Owner's sole judgment.

E. Illegible survey requests or requests for surveys without proper (at least 3 Business Days) notification, may result in delayed surveys. No extension of Contract Time will be allowed due to such delays.

F. If Owner's survey crews are not available to perform the survey staking following proper notification, Contractor shall provide its own survey staking. Provide Owner with Contractor's survey staking information in writing within 3 Business Days after it becomes available to Contractor.

1.15 Geotechnical Data and Existing Conditions.

A. Available Documentation: In accordance with, and subject to, the provisions of Document 00 3132 (Geotechnical Data and Existing Conditions), the following documentation is included with the Specifications:

Geotechnical Investigation
Fire Station No. 44 Replacement
Prepared by Geocon, Inc.
January 17, 2025

1.16 Protection of Existing Structures and Underground Facilities.

A. The Drawings may indicate existing above- and below-grade structures, drainage lines, storm drains, sewers, water lines, gas lines, electrical lines, hot water lines, and other similar items and Underground Facilities that are known to Owner. At least 2 Business Days, or as otherwise noted, prior to commencement of excavation, notify the owners of such underground facilities by calling Underground Service Alert of Northern California at telephone number 811 (800-227-2600).

B. Where overhead service to a structure, known to receive service, does not exist, then underground service shall be assumed to exist.

C. Attention is also directed to the existence of overhead power and telephone lines.

D. Perform pot-holing by hand within 24 inches (in any direction) of the Underground Facilities. This may be done on an area-by-area basis, but shall be accomplished at least 7 Days in advance of the date of construction within such area.

E. Telemetry antennas: Ensure that the telemetry and voice communication antennas located on the [Identify the Building] roof remain operational. Owner's telemetry system is critical to the function and operation of Owner's water supply and distribution system. Coordinate relocation of equipment related to the telemetry and voice communication systems with Owner. Notify Owner 3 Days prior to conducting any Work in the vicinity of the telemetry antenna.

F. No attempt has been made to locate private utilities on private property such as sprinkler irrigation systems or electrical conduits. Contact the property owners prior to construction.

G. In addition to reporting, if a utility is damaged, Contractor must take appropriate action as provided in Document 00 7200 (General Conditions).

H. Additional compensation or extension of time on account of utilities not indicated or otherwise brought to Contractor's attention including reasonable action taken to protect or repair damage shall be determined as provided in Document 00 7200 (General Conditions).

1.17 Permits.

A. Permits, agreements, or written authorizations that are known by Owner to apply to this Project are listed below:

1. Storm Water Pollution Prevention
2. Cal/OSHA Permit. Obtain, as applicable, permit(s) as required by Cal/OSHA for the following:
   a. Construction of trenches or excavations that are five feet or more in depth and into which a person is required to descend.
   b. Construction or demolition of any building, structure, or scaffolding for falsework more than three stories high, or the equivalent height (36 feet).
   c. Erection or dismantling of vertical shoring systems more than three stories high, or the equivalent height (36 feet).
3. County of San Mateo Building Permits, Demolition Permit, Generator Permit, Encroachment Permit
4. OK to Construct Letter from Montara Water and Sewer District.
5. OK to Disconnect Letter from PG&E.

B. All other permits that may be required, such as electrical, mechanical, fire prevention, irrigation, grading, slope protection, tree cutting, etc., have not been applied for and shall be obtained by Contractor. Applicable permit fees will be reimbursed to the extent specified in Document 00 7200 (General Conditions).

1.18 Actual Damages for Permit Violations.

A. In addition to damages which are impracticable or extremely difficult to determine, for which liquidated damages will be assessed as described in Document 00 5200 (Agreement) and Document 00 7200 (General Conditions), Owner may incur actual damages, including fines imposed by any regulatory agency, resulting from violation of legal or regulatory requirements where the violations result from Contractor's activities. Continuous operation of the equipment/activity in compliance with legal or regulatory requirements is essential to avoid discharges that would violate applicable regulations. Violations or threatened violations may subject Owner to fines of up to $5,000.00 per Day or occurrence and/or other costs or civil liabilities.

B. Contractor shall be liable for and shall pay Owner the amount of any actual losses in addition to liquidated damages or other remedies provided by the Contract Documents.

C. The amount of liquidated damages provided in Document 00 5200 (Agreement) and Document 00 7200 (General Conditions) is not intended to include, nor does the amount include, any damages incurred by Owner for reasons other than those listed in that paragraph. Any money due or to become due to Contractor may be retained by Owner to cover both the liquidated and the

actual damages described above and, should such money not be sufficient to cover such damages, Owner shall have the right to recover the balance from Contractor or its sureties.

PART 2 PRODUCTS

A. Owner's Responsibilities:

1. Arrange for and deliver Owner-reviewed Shop Drawings, Product Data, and Samples, to Contractor.
2. Arrange and pay for delivery to Site.
3. On delivery, inspect products jointly with Contractor.
4. Submit claims for transportation damage and replace damaged, Defective, or deficient items.
5. Arrange for manufacturers' warranties, inspections, and service.

B. Contractor's Responsibilities:

1. Review Owner-reviewed Shop Drawings, Product Data, and Samples.
2. Receive and unload products at Site; inspect for completeness or damage jointly with Owner.
3. Handle, store, install, and finish products.
4. Repair or replace items damaged after receipt.
5. Install into Project per Contract Documents.

END OF SECTION

DIVISION 1 GENERAL REQUIREMENTS

SECTION 01 2000

MEASUREMENT AND PAYMENT

PART 1 – GENERAL

1.01 SUMMARY

A. Section includes description of requirements and procedures for determining amount of Work performed and for obtaining payment for Work performed.

1.02 REFERENCES

A. California Public Contract Code
B. Code of Civil Procedure
C. Government Code
D. Civil Code

1.03 COMPOSITION AND SCOPE OF CONTRACT SUM

A. **Scope of Contract Sum**

1. The Contract Sum for performance of the Work under Contract Documents, or under any Bid item, allowance, or Alternate, shall include full compensation for all Work required under the Contract Documents, including without limitation, all labor, materials, taxes, transport, handling, storage, supervision, administration, and all other items necessary for the satisfactory completion of the Work, whether or not expressly specified or indicated, incidental work and unexpected expenses, and all terms, conditions, requirements and limitations set forth in the Contract Documents.

2. Contract Sum may be expressed as lump sum, unit price, GMP, allowance, or combination thereof.

B. **Unit Price items**

1. Quantity of Work to be paid for under any item for which a unit price is fixed in Contract Documents shall be determined by Owner based on, so far as practicable, actual number of units satisfactorily completed, as determined by Owner and certified by Contractor, within prescribed or ordered limits, and no payment will be made for Work unsatisfactorily performed or done outside of limits.
2. Unit Prices shall apply to Work covered by unit prices so long as actual quantities performed on the Project are not less than 75 percent or greater than 125 percent of the estimated quantities bid or otherwise stated in the Contract Documents. If actual quantities exceed these parameters, then the unit price shall be adjusted by an amount to reflect the Contractor's incremental cost differential resulting from increased or decreased economies of scale.

C. **Lump Sum Items**

1. When estimated quantity for specific portion of Work is not indicated and/or Work is designated as lump sum, payment will be on a lump sum basis for Work satisfactorily completed in accordance with Contract Documents.
2. Payment for lump sum Work, or items of Work subject to a lump sum (e.g. without limitation, change order work), shall be made on the basis of satisfactory completion of such Work or work item, earned in progressive stages in accordance with the Contract Documents, up to but not exceeding the Contractor's percentage completion of the Work or item.
3. Lump sum items shall be paid based upon the approved Schedule of Values, which shall be used to measure progressive payments based upon satisfactory progress towards completion of the item.

D. **Allowance Items**

1. Allowances: Allowance Work will be authorized by Owner in writing, following change order procedures to determine cost, supporting documentation and authorization to proceed. Unused allowance amounts at Contract completion shall reduce the Contract price accordingly.

1.04 PAYMENT PROCEDURES

A. **Schedule of Values:**

1. Within ten Days from issuance of Notice of Award and prior to the Contractor's first Application for Payment, Contractor shall submit a detailed breakdown of its Bid by scheduled Work items and/or activities, including coordination responsibilities and Project Record Documents responsibilities. Where more than one Subcontractor comprises the work of a Work item or activity, the Schedule of Values shall show a separate line item for each subcontract. Contractor shall furnish such breakdown of the total Contract Sum by assigning dollar values (cost estimates) to each applicable Progress Schedule network activity, which cumulative sum equals the total Contract Sum. This breakdown shall be referred to as the Schedule of Values.
2. Contractor's overhead, profit, insurance, cost of bonds (except to the extent expressly identified in a Bid item) and/or other financing, as well as "**general conditions costs**," (e.g., Site cleanup and maintenance, temporary roads and access, off-Site access roads, temporary power and lighting, security, and the like), shall be prorated through all activities so that the sum of all the Schedule of Values line items equals Contractor's total Contract Sum, less any allowances designated by Owner. Scheduling, record documents and quality assurance control shall be separate line items.
3. Owner will review the breakdown in conjunction with the Progress Schedule to ensure that the dollar amounts of this Schedule of Values are, in fact, reasonable cost allocations for the Work items listed. Upon favorable review by Owner, Owner will accept this Schedule of Values for use. Owner shall be the sole judge of fair market cost allocations.
4. Owner will reject any attempt to increase the cost of early activities, i.e., "**front loading**," resulting in a complete reallocation of moneys until such front loading is corrected. Repeated attempts at front loading may result in suspension or termination of the Work for default, or refusal to process progress payments until such time as the Schedule of Values is acceptable to Owner.

B. **Contractor's Requests for Progress Payments**

1. If requested by Contractor, progress payments will be made monthly, under the following conditions:
2. On or before the 25th Day of each month, Contractor shall submit to Owner five copies of an Application for Payment for the cost of the Work put in place during the period from the last Day of the previous month to the end of the current month, along with one copy of an updated Progress Schedule. Such Applications for Payment shall be for the expected total value of activities completed or partially completed, based upon Schedule of Values prices (or Bid item prices if unit price) of all labor and materials incorporated in the Work up until midnight of the last Day of that one month period, less the aggregate of previous payments. Accumulated retainage shall be shown as separate item in payment summary. Owner and Contractor will reconcile any differences in the field, based on the reconciled monthly report sheets. If Contractor is late submitting its Application for Payment, that Application may be processed at any time during the succeeding one-month period, resulting in processing of Contractor's Application for Payment being delayed for more than a Day for Day basis.
3. Except as otherwise provided in a labor compliance program applicable to the Work or as otherwise required by Owner, concurrently with each Application for Payment, Contractor shall submit to Owner Contractor's and its Subcontractors' certified payroll records required to be maintained pursuant to Labor Code Section 1776 for all labor performed during pay periods ending during the period covered by the Application for Payment.
4. No progress payment will be processed prior to Owner receiving all requested, acceptable

schedule update information and certified payrolls, and in Owner's sole and absolute discretion, Owner may deny the entire Application for Payment for noncompliance.

5. Each Application for Payment shall list each Change Order and Construction Change Directive (**CCD**) executed prior to date of submission, including the Change Order/CCD Number, and a description of the Work activities, consistent with the descriptions of original Work activities. Contractor shall submit a monthly Change Order/CCD status log to Owner.
6. If Owner requires substantiating data, Contractor shall submit information requested by Owner, with cover letter identifying Project, Application for Payment number and date, and detailed list of enclosures. Contractor shall submit one copy of substantiating data and cover letter for each copy of Application for Payment submitted.
7. If Contractor fails or refuses to participate in monthly Work reconciliations or other construction progress evaluation with Owner, Contractor shall not receive current payment until Contractor has participated fully in providing construction progress information and schedule update information to Owner.

C. **Owner's Review of Progress Payment Applications**

1. Owner will review Contractor's Application for Payment following receipt and during the Progress Schedule and Billing Meeting. If adjustments need to be made to percent of completion of each activity, Owner will make appropriate notations and return to Contractor. Contractor shall revise and resubmit. All parties shall update percentage of completion values in the same manner, i.e., express value of an accumulated percentage of completion to date.
2. If Owner determines that portions of the Application for Payment are not proper or not due under the Contract Documents, then Owner may approve the other portions of the Application for Payment, and in the case of disputed items or Defective Work not remedied, may withhold up to 150 percent of the disputed amount from the progress payment.
3. Pursuant to California Public Contract Code Section 20104.50, if Owner fails to make any progress payment within 30 Days after receipt of an undisputed and properly submitted Application for Payment from Contractor, Owner shall pay interest to the Contractor equivalent to the legal rates set forth in subdivision (a) of Section 685.010 of the California Code of Civil Procedure. The 30-Day period shall be reduced by the number of Days by which Owner exceeds the seven-Day return requirement set forth herein.
4. As soon as practicable after approval of each Application for Payment for progress payments, Owner will pay to Contractor in manner provided by law, an amount equal to 95 percent of the amounts otherwise due as provided in the Contract Documents, or a lesser amount if so provided in Contract Documents and by law, provided that payments may at any time be withheld if, in judgment of Owner, Work is not proceeding in accordance with Contract, or Contractor is not complying with requirements of Contract, or to comply with stop notices or to offset liquidated damages accruing or expected. In Owner's sole discretion, if Contractor has failed to comply with either its Progress Schedule update or project record documents requirements, Owner may retain an additional 5% of any earned amounts until such requirements are satisfied.
5. Before any progress payment or final payment is due or made, Contractor shall submit satisfactory evidence that Contractor is not delinquent in payments to employees, Subcontractors, suppliers, or creditors for labor and materials incorporated into Work. This specifically includes, without limitation, conditional lien release forms for the current progress payment and unconditional release forms for past progress payments. This also includes copies of certified payroll from contractor and subcontractors for the current payment period.

D. **Payment for Material and Equipment Not Yet Incorporated Into the Work**

1. No payment shall be made for materials or equipment not yet incorporated into the Work, except as specified elsewhere in the Contract Documents or as may be agreed to by Owner in its sole discretion. Where Contractor requests payment on the basis of materials and equipment not incorporated in the Work, Contractor must satisfy the following conditions:
2. The materials and/or equipment shall be delivered and suitably stored at the Site or at another local location agreed to in writing, for example, a mutually acceptable bonded and

insured warehouse.

3. Full title to the materials and/or equipment shall vest in Owner at the time of delivery to the Site, warehouse or other storage location. Obtain a negotiable warehouse receipt, endorsed over to Owner for materials and/or equipment stored in an off-site warehouse. No payment will be made until such endorsed receipts are delivered to Owner.
4. Stockpiled materials and/or equipment shall be available for Owner inspection, but Owner shall have no obligation to inspect them and its inspection or failure to inspect shall not relieve Contractor of any obligations under the Contract Documents. Materials and/or equipment shall be segregated and labeled or tagged to identify these specific Contract Documents.
5. After delivery of materials and/or equipment, if any inherent or acquired defects are discovered, defective materials and/or equipment shall be removed and replaced with suitable materials and/or equipment at Contractor's expense.
6. At Contractor's expense, insure the materials and/or equipment against theft, fire, flood, vandalism, and malicious mischief, as well as any other coverages required under the Contract Documents.
7. Contractor's Application for Payment shall be accompanied by a bill of sale, invoice or other documentation warranting that Owner has received the materials and equipment free and clear of all liens and evidence that the materials and equipment are covered by appropriate property insurance and other arrangements to protect Owner interest therein, all of which must be satisfactory to Owner. This documentation shall include, without limitation, conditional releases of mechanics' liens and stop notices from all those providing materials and equipment as to which the Application for Payment relates, as well as unconditional releases of the same from the same as to the previous Application for Payment for which they have not already been provided. Amounts previously paid for materials and equipment prior to incorporation into the Work shall be deducted from amounts otherwise due Contractor as they are incorporated.

1.05 FINAL PAYMENT

A. Final Payment

1. As soon as practicable after all required Work is completed in accordance with Contract Documents, including punchlist, testing, record documents and Contractor maintenance after Final Acceptance, Contractor shall submit its Application for Final Payment.
2. Provided Contractor has met all conditions required for Final payment, Owner will pay to Contractor, in manner provided by law, unpaid balance of Contract Sum of Work (including, without limitation, retentions), or whole Contract Sum of Work if no progress payment has been made, determined in accordance with terms of Contract Documents, less sums as may be lawfully retained under any provisions of Contract Documents or by law.

B. Final Accounting

1. Prior progress payments and change orders shall be subject to audit and correction in the final payment.
2. Contractor and each assignee under an assignment in effect at time of final payment shall execute and deliver at time of final payment, and as a condition precedent to final payment, Document 00 6530 (Agreement and Release of Claims).

1.06 SUBSTITUTION OF SECURITIES

A. **Public Contract Code Section 22300.** In accordance with the provisions of Public Contract Code Section 22300, substitution of securities for any moneys withheld under Contract Documents to ensure performance is permitted under following conditions:

1. At request and expense of Contractor, securities listed in Section 16430 of the Government Code, bank or savings and loan certificates of deposit, interest bearing demand deposit accounts, standby letters of credit, or any other security mutually agreed to by Contractor and Owner which are equivalent to the amount withheld under retention provisions of Contract shall be deposited with Controller or with a state or federally chartered bank in

California, as the escrow agent, who shall then pay such moneys to Contractor. Upon satisfactory completion of Contract, securities shall be returned to Contractor.

2. Alternatively, Contractor may request and Owner shall make payment of retentions earned directly to the escrow agent at the expense of Contractor. At the expense of Contractor, Contractor may direct the investment of the payments into securities and receive the interest earned on the investments upon the same terms provided for securities deposited by Contractor. Upon satisfactory completion of the work of the Contract Documents, Contractor shall receive from escrow agent all securities, interest, and payments received by the escrow agent from Owner. Consistent with Public Contract Code Section 7107(d), Contractor shall then pay to each Subcontractor, not later than seven Days after receipt of the payment, the respective amount of interest earned, net of costs attributed to retention withheld from each Subcontractor, on the amount of retention withheld to insure the performance of Contractor.
3. Contractor shall be beneficial owner of securities substituted for moneys withheld and shall receive any interest thereon.
4. Contractor may enter into an escrow agreement, form included in Contract Documents, as authorized under Public Contract Code Section 22300, specifying amount of securities to be deposited, terms and conditions of conversion to cash in case of default of Contractor, and termination of escrow upon completion of Contract Documents.
5. Public Contract Code Section 22300, in effect on Bid Day, is hereby incorporated in full by this reference and shall supersede anything inconsistent therewith.

ARTICLE 3 - PRODUCTS – NOT USED

ARTICLE 4 - EXECUTION – NOT USED

END OF SECTION

DIVISION 1 GENERAL REQUIREMENTS

SECTION 01 2600

MODIFICATION PROCEDURES

PART 1 – GENERAL

1.01 SUMMARY

A. Section includes requirements that supplement the paragraphs of Document 00 7200 (General Conditions).

B. Description of procedures for modifying the Contract Documents and determining costs for changes in Contract Sum or Contract Time.

1.02 PROCEDURES FOR CONTRACTOR INITIATED CHANGE ORDER

A. Contractor-Initiated Change Proposal Request (**CPR**) and Procedures**:**

1. Contractor may initiate changes by submitting a Change Proposal Request (**CPR**).
2. Whenever Contractor elects or is entitled to submit a CPR, Contractor shall prepare and submit to Owner for consideration a CPR using the Cost Proposal Form attached to this Section 01 2600 or otherwise included in this Project Manual. All CPR's must contain a complete breakdown of costs of credits, deducts and extras; itemizing labor, materials, equipment, markup, bonds, insurance and taxes; and any requested changes to Contract Time. All Subcontractor Work shall be so indicated. Individual entries on the CPR form shall include applicable Schedule of Values code, with all amounts determined as provided herein. After receipt of a CPR with a detailed breakdown, Owner will act promptly thereon.
3. If Owner accepts a CPR, Owner will prepare a Change Order for Owner and Contractor signatures.
4. If CPR is not acceptable to Owner because it does not agree with Contractor's proposed cost and/or time, Owner will provide comments thereto. Contractor will then, within seven (7) Days (except as otherwise provided herein), submit a revised CPR.
5. When necessity to proceed with a change does not allow Owner sufficient time to conduct a proper check of a CPR (or revised CPR), Owner may issue a Change Directive (**CD**) as provided below.

B. Contractor-Initiated Request for Information (**RFI**) Procedures, Requirements and Limitations:

1. Contractor may submit RFI's for clarifications in Owner-prepared Contract Documents, which may result in the Contractor submitting a CPR.
2. Whenever Contractor requires information regarding the Project or Owner-prepared Contract Documents, or receives a request for such information from a Subcontractor, Contractor may prepare and deliver an RFI to Owner. Contractor shall use RFI format provided on approval by Owner. Contractor shall not issue an RFI to Owner solely to clarify Contractor-prepared Construction Documents. Contractor must submit time critical RFIs at least 30 days before scheduled start date of the affected Work activity. Contractor shall reference each RFI to an activity of Progress Schedule and shall note time criticality of the RFI, indicating time within which a response is required. Contractor's failure to reference RFI to an activity on the Progress Schedule and note time criticality on the RFI shall constitute Contractor's waiver of any claim for time delay or interruption to the Work resulting from any delay in responding to the RFI.
3. Contractor shall be responsible for its costs to implement and administer RFIs throughout the Contract duration. Regardless of the number of RFIs submitted, Contractor shall not be entitled to additional compensation for the effort required to submit the RFIs. Contractor shall be responsible for Owner's administrative costs for answering RFIs where the answer could reasonably be found by reviewing the Contract Documents, as determined by Owner; at Owner discretion, such costs may be deducted from progress payments or final payment.

4. Owner will respond within ten (10) days from receipt of RFI with a written response to Contractor. Contractor shall distribute response to all appropriate Subcontractors.
5. If Contractor is satisfied with the response and does not request a change in Contract Sum or Contract Time, then the response shall be executed without a change.
6. If Contractor believes the response is incomplete, Contractor shall issue another RFI (with the same RFI number with the letter "A" indicating it is a follow-up RFI) to Owner clarifying original RFI. Additionally, Owner may return RFI requesting additional information should original RFI be inadequate in describing condition.

C. Time Requirements:

1. If Contractor believes that an Owner response to an RFI, submittal or other Owner direction, results in change in Contract Sum or Contract Time, Contractor shall notify Owner with the issuance of a preliminary CPR within 10 Days after receiving Owner's response or direction, and in no event after starting the disputed work or later than the time allowed under Article 12 of Document 00 7200 (General Conditions). If Contractor also requests a time extension, or has issued a notice of delay or otherwise requests a time extension with a CPR, then Contractor shall submit the TIE required in these Contract Documents, including Section 01 3200 (Progress Schedules and Reports), concurrently with the CPR and in no event later than 10 Days after providing the notice of delay.
2. If Contractor requires more time to accurately identify the required changes to the Contract Sum or Contract Time, Contractor may submit an updated and final CPR and TIE within 14 days of submitting the preliminary CPR.
3. If Owner agrees with Contractor's CPR and/or TIE, then Owner will prepare a Change Order for Owner and Contractor signatures. If Owner disagrees with Contractor, then Contractor may give notice of potential claim as provided in Article 12 of Document 00 7200 (General Conditions), and proceed thereunder.
4. Contractor must submit all CPR's (preliminary and final), notices of potential claim and Claims, and TIE's within the required time periods. Any failure to do so waives Contractor's right to submit a CPR or file a Claim.

D. Cost Estimate Information:

1. Contractor and subcontractors shall, upon Owner's request, permit inspection of the original unaltered cost estimates, subcontract agreements, purchase orders relating to the change, and documents substantiating all costs associated with its CPR or Claims arising from changes in the Work.

1.03 PROCEDURES FOR OWNER INITIATED CHANGE ORDERS

A. Owner Initiated Change Directives (**CD**):

1. Owner may, by Change Directive (**CD**) or initially by Instruction Bulletin or by following the procedures for disputed work herein, order changes in the Work within the general scope of the Contract consisting of additions, deletions, or other revisions, with or without adjustment to Contract Sum or Contract Time.
2. If at any time Owner believes in good faith that a timely Change Order will not be agreed upon using the foregoing procedures, or at any other time, Owner may issue a CD with its recommended cost and/or time adjustment (if any). Upon receipt of CD, Contractor shall promptly proceed with the change of Work involved and respond to Owner within ten (10) Days.
3. Contractor's response must be any one of following:

   a. Return CD signed, thereby accepting Owner response, including adjustment to time and cost (if any).
   b. Submit a (revised if applicable) Cost Proposal with supporting documentation (if applicable, reference original Cost Proposal number followed by letter A, B, etc. for each revision), if Owner so requests.
   c. Give notice of intent to submit a claim as described in Article 12 of Document 00 7200 (General Conditions), and submit its claim as provided therein.

4. If CPR or the CD provides for an adjustment to any Contract Sum, the adjustment shall be based on one of the following methods:

   a. Mutual acceptance of a lump sum properly itemized and supported by sufficient substantiating data to permit evaluation.
   b. Contractor to proceed on cost reimbursable (force account) basis while negotiating towards a firm price.
   c. Cost to be determined in a manner agreed.

5. Change Directive signed by Contractor indicates the agreement of Contractor therewith, including adjustment in Contract Sum or the method for determining them. Such agreement shall be effective immediately and shall be finalized as a Change Order. Where Owner authorizes CD work on a time and materials basis up to a maximum amount, then Contractor shall promptly advise Owner upon reaching 75% of such maximum amount, otherwise Contractor shall accept fully the risk of completing the CD work without exceeding such maximum amount.
6. If Contractor does not respond promptly or disagrees with the method for adjustment (or non-adjustment) in the Contract Sum, the method and the adjustment shall be determined by Owner on the basis of the Contract Documents and the reasonable expenditures and savings of those performing the Work attributable to the change. If the parties still do not agree on the proper adjustment due to a Change Directive, Contractor may file a Claim per Article 12 of Document 00 7200 (General Conditions) and/or Owner may direct the changed work through a unilateral change order. Contractor shall keep and present an itemized accounting in a manner consistent with the SOV, together with appropriate supporting data. Unless otherwise provided in the Contract Documents, costs for the purposes of this paragraph shall be limited to those provided herein.
7. Pending final determination of cost to Owner, Contractor may include amounts not in dispute in its Applications for Payment. The amount of credit to be allowed by Contractor to Owner for a deletion or change which results in a net decrease in the Contract Sum shall be actual net cost as confirmed by Owner. When both additions and credits covering related Work or substitutions are involved in a change, the allowance for Markup shall be figured on the basis of net increase, if any, with respect to that change.

B. Owner Initiated Change Order (**CO**) or Request for Proposal (**RFP**):

1. Owner may initiate changes in the Work or Contract Time by issuing a Request for Proposal (**RFP**) or Change Order (**CO**) to Contractor.
2. Owner may issue an RFP to Contractor. Any RFP will detail all proposed changes in the Work and request a quotation of changes in Contract Sum and Contract Time from Contractor.
3. In response to an RFP, Contractor shall furnish a Change Proposal Request (**CPR**) within twenty-one (21) Business Days of Owner's RFP. Upon approval of CPR, Owner may issue a Change Directive directing Contractor to proceed with extra Work.
4. If the parties agree on price and time for the work, the Owner will issue a Contact Change Order. If the parties do not agree on the price or time for a CPR, Owner may either issue a CD or decide the issue per Article 12 of Document 00 7200 (General Conditions). Contractor shall perform the changed Work notwithstanding any claims or disagreements of any nature.

1.04 PROCEDURES THAT APPLY TO CONTRACTOR- AND OWNER-INITIATED CHANGE ORDERS

A. Adjustment of Schedules to Reflect Change Orders or CDs:

1. Contractor shall revise Schedule of Values and Application for Payment forms to record each authorized Change Order or CD as a separate line item and adjust the Contract Sum as shown thereon prior to the next monthly pay period.
2. Contractor shall revise the Progress Schedules prior to the next monthly pay period, to reflect CO or CD.

3. Contractor shall enter changes in Project Record Documents prior to the next monthly pay period.

B. Required Documentation for Adjustments to Contract Amounts:

1. For all changes and cost adjustments requested, Contractor shall provide documentation of change in Contract Amounts asserted, with sufficient data to allow evaluation of the proposal.
2. In all requests for compensation, cost proposals, estimates, claims and any other calculation of costs made under the Contract Documents, Contractor shall breakout and quantify costs of labor, equipment and materials identified herein, for Contractor and subcontractors of any tier.
3. Contractor shall, on request, provide additional data to support computations for:

   a. Quantities of products, materials, labor and equipment.
   b. Taxes, insurance, and bonds.
   c. Justification for any change in Contract Time and new Progress Schedule showing revision due, if any.
   d. Credit for deletions from Contract, similarly documented.

4. Contractor shall support each claim or computation for additional cost, with additional information including:

   a. Origin and date of claim or request for additional compensation.
   b. Dates and times Work was performed and by whom.
   c. Time records and wage rates paid.
   d. Invoices and receipts for products, materials, equipment and subcontracts, similarly documented.
   e. Credit for deletions from Contract, similarly documented.

C. Responses and Disputes:

1. For all responses for which the Contract Documents do not provide a specific time period, recipients shall respond within a reasonable time.
2. For all disputes arising from the procedures herein, Contractor shall follow Article 12 of Document 00 7200 (General Conditions).

1.05 COST DETERMINATION FOR CHANGES IN CONTRACT AMOUNTS

A. Calculation of Total Cost of Extra Work:

1. Total cost of changed Work, extra Work or of Work omitted shall be the sum of three components defined immediately below as: Component 1 (Direct Cost of Construction or Direct Costs); Component 2 (Markup); and, Component 3 (Bonds, Insurance, Taxes)
2. Component 1: Direct Costs of labor, equipment and materials, is calculated based upon actually incurred (or omitted) labor costs, equipment rental costs, and material costs, as defined herein;
3. Component 2: Markup on such actually incurred Direct Costs, is applied in the percentages identified below; and
4. Component 3: Actual additional costs for any additionally required bonds, insurance, and/or taxes by Contractor, Subcontractors, or other forces, defined herein, is calculated without markup.
5. All amounts payable to Subcontractors under Components 1, 2, and 3: must be earned under the terms of the applicable Subcontracts; must be properly requested, documented and permitted under the terms of the applicable subcontract(s) and Contract Documents; and shall be payable only if changed Work complies with terms of Contract Documents.

1.06 MEASUREMENT OF DIRECT COST OF CONSTRUCTION (COST COMPONENT 1)

A. Composition of Component 1 (Direct Cost of Construction):

1. Component 1 has three subcomponents, also referred to as labor, equipment, and materials (**LEM)**:

    a. Labor (Component 1A)
    b. Equipment (Component 1B)
    c. Materials (Component 1C)

B. Measurement of Cost of Labor (Component 1A):

1. Cost of Labor shall be calculated as: Cost of labor for workers (including forepersons when authorized by Owner) used in actual and direct performance of the subject work, whether employer is Contractor, Subcontractor or other forces, in the sum of the following:

    a. Actual Wages: Actual wages paid shall include any employer payments to or on behalf of workers for health and welfare, pension, vacation, and similar purposes.
    b. Labor surcharge: Payments imposed by local, county, state, and federal laws and ordinances, and other payments made to, or on behalf of, workers, other than actual wages as defined, such as worker's compensation insurance. Such labor surcharge shall not exceed generally accepted standards in the State for labor rates in effect on date upon which extra Work is accomplished.
    c. Cost of labor shall include no other costs, fees or charges.

2. Labor cost for operators of equipment owned and operated by Contractor or any Subcontractor, shall be no more than rates of such labor established by collective bargaining agreements for type of worker and location of Work, whether or not owner-operator (i.e., Contractor or Subcontractor) is actually covered by such an agreement.
3. Cost of labor shall be recorded and documented in certified payroll records, maintained in the form customary and/or required in the State, and delivered to Owner weekly.

C. Measurement of Cost of Equipment (Component 1B):

1. Measurement of Component 1B (Cost of Equipment). Cost of Equipment shall be calculated as: Cost of equipment used in actual and direct performance of the subject work, whether by Contractor, Subcontractor or other forces. Cost of Equipment shall be calculated as herein described.
2. For rented equipment, cost will be based on actual rental invoices, appropriate for the use and duration of the work. Equipment used on extra Work shall be of proper size and type. If, however, equipment of unwarranted size or type and cost is used, cost of use of equipment shall be calculated at rental rate for equipment of proper size and type, as determined by Owner.
3. Equipment rental cost for Contractor or Subcontractor-owned equipment, shall be determined by reference to, and not in excess of, the generally accepted standards in the State for equipment rental rates in effect on date upon which extra Work is accomplished. If there is no applicable rate for an item of equipment, then payment shall be made for Contractor or Subcontractor-owned equipment at rental rate listed in the most recent edition of the Caltrans Standard Schedules and Specifications, and absent a rental rate therein, then the Association of Equipment Distributors (**AED**) book.
4. In all cases, rental rates paid shall be deemed to cover cost of fuel, oil, lubrication, supplies, small tools, necessary attachments, repairs and maintenance of any kind, depreciation, storage, insurance, and all incidentals.
5. Unless otherwise specified, manufacturer's ratings, and manufacturer-approved modifications, shall be used to classify equipment for determination of applicable rental rates. Individual pieces of equipment or tools not listed in said publication and having a replacement value of $100 or less, whether or not consumed by use, shall be considered to be small tools and no payment will be made therefore as payment is included in payment for labor. Rental time will not be allowed while equipment is inoperative due to breakdowns.
6. For equipment on Site, rental time to be paid for equipment shall be time equipment is in operation on extra Work being performed or on standby as approved by Owner. The following shall be used in computing rental time of equipment:

a. When hourly rates are listed, less than 30 minutes of operation shall be considered to be ½ hour of operation.
b. When daily rates are listed, less than four hours of operation shall be considered to be ½ Day of operation.
c. Rates shall correspond to actual rates paid by Contractor, i.e., if Contractor pays lower weekly or monthly rates, then same shall be charged to Owner.

7. For equipment that must be brought to Site to be used exclusively on extra Work, cost of transporting equipment to Site and its return to its original location shall be determined as follows:

a. Owner will pay for costs of loading and unloading equipment.
b. Cost of transporting equipment in low bed trailers shall not exceed hourly rates charged by established haulers.
c. Cost of transporting equipment shall not exceed applicable minimum established rates of California Public Utilities Commission or appropriate State Dept. of Transportation.
d. Owner will not make any payment for transporting and loading and unloading equipment if equipment is used on Work in any other way than upon extra Work.
e. Rental period may begin at time equipment is unloaded at Site of extra Work and terminate at end of the performance of the extra Work or Day on which Owner directs Contractor to discontinue use of equipment, whichever first occurs. Excluding Saturdays, Sundays, and Owner legal holidays, unless equipment is used to perform extra Work on such Days, rental time to be paid per Day shall be four hours for zero hours of operation, six hours for four hours of operation and eight hours for eight hours of operation, time being prorated between these parameters. Hours to be paid for equipment that is operated less than eight hours due to breakdowns, shall not exceed eight less number of hours equipment is inoperative due to breakdowns.

8. Employee vehicles are not part of Component 1A, rather, are included within Component 2 (Markup).
9. Cost of Equipment shall include no other costs, fees or charges.

D. Measurement of Cost of Material (Component 1C):

1. Cost of Material shall be calculated as herein described. Cost of such materials will be cost to purchaser (Contractor, Subcontractor or other forces) from supplier thereof, except as the following are applicable:
2. If cash or trade discount by actual supplier is offered or available to purchaser, it shall be credited to Owner notwithstanding fact that such discount may not have been taken.
3. For materials salvaged upon completion of Work, salvage value of materials shall be deducted from cost, less discounts, of materials.
4. If cost of a material is, in opinion of Owner, excessive, then cost of material shall be deemed to be lowest current wholesale price at which material is available in quantities concerned delivered to Site, less any discounts as provided in this Paragraph.
5. Cost of Material shall include no other costs, fees or charges.

1.07 MEASUREMENT AND PAYMENT OF MARKUP (COST COMPONENT 2)

A. Markup Percentages for Changed Work (Component 2):

1. Markup on Direct Cost of labor, materials and equipment for extra Work pursuant to the Contract Documents performed by Contractor shall be 15%.
2. When extra Work is performed by Subcontractors, regardless of the number of tiers, total Markup on Component 1 Direct Costs shall be 20%. Contractor and its Subcontractors shall divide the 20% as they may agree.
3. Under no circumstances shall the total Markup on any extra Work exceed 20%, stated as a percent of the Direct Cost of labor, equipment and materials. This limitation shall apply regardless of the actual number of subcontract tiers.
4. On proposals covering both increases and decreases in Contract Sum, Markup shall be allowed on the net increase only as determined above. When the net difference is a deletion,

no percentage for Markup shall be allowed, but rather an appropriate percentage deduction shall be issued in the amount of the net difference.

B. Measurement and Payment of Markup (Component 2):

1. Markup (Component 2) provides complete compensation to Contractor and all Subcontractors for:

   a. All Contractor and Subcontractor profit;
   b. All Contractor and Subcontractor home-office overhead;
   c. All Contractor and Subcontractor assumption of risk assigned to Contractor under the Contract Documents;
   d. Subject to the qualifications below regarding self-performed work, all General Conditions and General Requirements of Contractor (and, if applicable, Subcontractors).

2. Profit. Compensation for profit included within Component 2 (Markup), includes without limitation: Fees of all types, nature and description; and Profit and margins of all types, nature and description.
3. Home Office Expenses. Compensation for home office expenses included within Component 2 (Markup), includes without limitation: Salaries and other compensation of any type of Contractor's and Subcontractor's personnel (management, administrative and clerical), and all direct and indirect operating, travel, payroll, safety, storage, quality control, maintenance and overhead costs of any nature whatsoever, incurred by Contractor and Subcontractors at any location other than the Project specific site office, including without limitation, Contractor's principal or branch offices; insurance premiums other than those for Project specific insurance directed by the Owner in a change order; all hardware, software, supplies and support personnel necessary or convenient for Contractor's capture, documentation and maintenance of its costs and cost accounting data and cost accounting and control systems and work progress reporting.
4. Assumption of Risk. Compensation for Contractor's and Subcontractor's assumption of risk under the Contract Documents, included within Component 2 (Markup), includes, without limitation, loss, cost, damage, expense or liability resulting directly or indirectly from any of the following causes (**unallowable costs**), for Contractor and Subcontractors of any tier: noncompliance with the Contract Documents, fault or negligence, defective or non-conforming Work, by Contractor or any Subcontractor or Vendor of any tier or anyone directly or indirectly employed by any of them, or for whose acts or omissions any of them are responsible or liable at law or under the Contract Documents; cost overruns of any type; costs in excess of any lump sum, not to exceed amount or GMP; costs resulting from bid or "buy out" errors, unallocated scope, or incomplete transfer of scope or contract terms to Subcontractors; any costs incurred by Contractor relating to a Change in the Work without a Change Order or Change Directive in accordance with the Contract Documents; costs for work or materials for which no price is fixed in the Contract Documents, unless it is expressly specified that such work or material is to be paid for as extra work.
5. General Conditions and Division 1 General Requirements. Compensation for Contractor's (and, if applicable Subcontractors') General Conditions and General Requirements Costs included within Component 2 (Markup) includes compensation for: Contractor's direct costs, without overhead or profit, for salaries and related forms of compensation and employer's costs for labor and personnel costs, of Contractor's employees and subconsultant's employees (if any), while and only to the extent they are performing Work at the Project Site, and all "General Requirements Costs" below. Personnel and Work compensated by this Component include, without limitation: All required Project management responsibilities; all on-site services; monthly reporting and scheduling; routine field inspection of Work; general superintendence; general administration and preparation of cost proposals, schedule analysis, change orders and other supporting documentation as necessary; salaries of project superintendent, project engineers, project managers, safety manager, other manager, timekeeper, and secretaries; all cost estimates and updates thereto; development, validation and updates to the project schedule; surveying; and estimating. General

Requirements Costs included within Component 2 (Markup) include, without limitation: all scheduling hardware, software, licenses, equipment, materials and supplies; purchase, lease or rental, build out, procurement, supporting equipment and maintenance of temporary on-Site facilities, Project field and office trailers and other temporary facilities, office equipment and supporting utilities; platforms, fencing, cleanup and jobsite security; temporary roads, parking areas, temporary security or safety fencing and barricades, etc.; all Contractor's motor vehicles used by any Contractor's personnel, and all costs thereof; all health and safety requirements, required by law or Owner procedures; all surveying; all protection of Work; handling and disposal fees; final cleanup; repair or maintenance; other incidental Work; all items, activities and function similar to any of those described above; all travel, entertainment, lodging, board and the like.

6. Personnel compensated by the Markup Component do not include workers of foreman level or below in the case of self-performed work; rather, such personnel shall be treated as a Direct Cost of Construction. Costs compensated by Component 2 (Markup) do not include temporary measures specifically required by the changed work, not otherwise required or ongoing in the prosecution of the Work, that commence specifically to support the changed work and conclude with the completion of the changed work. Such costs shall be treated as Direct Costs of Construction. Examples of General Requirements costs that this component may not cover are the following: temporary barricades or fencing of specific areas required specifically for the changed work; cranes required specifically for the changed work; and extra security required specifically for the changed work.

1.08 MEASUREMENT AND PAYMENT OF BONDS, INSURANCE, TAXES (COMPONENT 3)

A. Measurement of Bonds, Insurance, Taxes (Component 3):

1. Component 3 (Bonds, Insurance, Taxes) consists of the cost of bonds, insurance and taxes, also referred to as **BIT**. All State sales and use taxes, applicable County and applicable local sales taxes, shall be included. Federal and Excise tax shall not be included.
2. There is no markup on BIT.

1.09 EFFECT OF PAYMENT

A. Change Order Compensation is All Inclusive.

1. Except as provided expressly below regarding changes that extend the Contract Time, payment of calculated cost of extra work constitutes full and complete compensation for costs or expense arising from the extra Work, and is intended to be all inclusive.
2. Payment for Direct Cost of Construction (Component 1 or LEM) is intended to be all-inclusive. Any costs or risks not delineated within cost of labor, equipment or materials herein, shall be deemed to be within the costs and risks encompassed by the applicable Markups and unallowable in any separate amount.
3. Payment of Markup (Component 2) is intended to be all-inclusive. Contractor waives claims for any further or different payment of cost and risk items delineated herein, other than the allowable percentage markup on costs set forth in the Contract Documents; such separate, further or different cost or risk items shall be unallowable, waived and liquidated within the allowable percentage markup.
4. Contractor shall recover no other costs or markups on extra work of any type, nature or description.

B. Exception for Changes Extending the Contract Time.

1. Where a change in the Work extends the Contract Time, Contractor may request and recover additional, actual direct LEM costs, provided Contractor can demonstrate such additional costs are (i.) actually incurred performing the Work, (ii.) not compensated by Component 2 (Markup), and (iii) directly result from the extended Contract Time. Contractor shall make such request and provide such documentation following all required procedures,

documentation and time requirements in the Contract Documents, and subject to all contract limitations of liability. Contractor may not seek or recover such costs using formulas (e.g., Eichleay).

C. Limits of Liability/Accord and Satisfaction.

1. The foregoing limits of compensation apply in all cases of claims for changed Work, whether calculating Change Proposal Requests, Change Orders or CDs, or calculating claims and/or damages of all types, and applies even in the event of fault, negligence, strict liability, or tort claims of all kinds, including strict liability or negligence. Contractor may recover no other costs arising out of or connected with the performance of extra Work, of any nature.
2. Under no circumstances may Contractor claim or recover special, incidental or consequential damages against Owner, its representatives or agents, whether arising from breach of contract, negligence, strict liability or other tort or legal theory, unless specifically and expressly authorized in the Contract Documents.
3. No change in Work shall be considered a waiver of any other condition of Contract Documents. No claim shall be made for anticipated profit, for loss of profit, for damages, or for extra payment whatever, except as expressly provided for in Contract Documents.
4. Accord and Satisfaction: Every Change Order and accepted CD shall constitute a full accord and satisfaction, and release, of all Contractor (and if applicable, Subcontractors) claims for additional time, money or other relief arising from or relating to the subject matter of the change including, without limitation, impacts of all types, cumulative impacts, inefficiency, overtime, delay and any other type of claim. Contractor may elect to reserve its rights to disputed claims arising from or relating to the changed Work at the time it signs a Change Order or approves a CD, but must do so expressly in a writing delivered concurrently with the executed Change Order or approved CD, and must also submit a Claim for the reserved disputed items pursuant to Article 12 of Document 00 7200 (General Conditions) no later than thirty (30) days after Contractor's first written notice of its intent to reserve rights. Execution of any Change Order or CD shall constitute Contractor's representation of its agreement with this provision.

1.10 MISCELLANEOUS REQUIREMENTS

A. Owner-Furnished Materials.

1. Owner reserves right to furnish materials as it deems advisable, and Contractor shall have no claims for costs and Markup on such materials.

B. Records And Certification.

1. All charges shall be recorded daily and summarized in Change Proposal Request form attached hereto. Contractor or authorized representative shall complete and sign form each day. Contractor shall also provide with the form: the names and classifications of workers and hours worked by each; an itemization of all materials used; and a list by size type and identification number of equipment and hours operated.
2. Owner shall have the right to audit all records in possession of Contractor relating to activities covered by Contractor's claims for modification of Contract, including CD Work. This right shall be specifically enforceable, and any failure of Contractor to voluntarily comply shall be deemed an irrevocable waiver and release of all claims then pending that were or could have been subject to Article 12 of Document 00 7200 (General Conditions).

END OF SECTION

[COST PROPOSAL FORM FOLLOWS ON NEXT PAGE]

COST PROPOSAL FORM

Fire Station #44 Replacement Project

CP Number: _____
Date: _____
In Response To _____
(RFP #, etc.)

To: Coastside Fire Protection District
Attention: **[_____]**
1191 Main Street, Half Moon Bay, CA 94019
Phone: (___) ___- _____
Fax: (___) ___-_____

From: [Insert Contractor's Name/Address]
_____
_____

This Cost Proposal is in response to the above-referenced _____ **[insert RFP, etc. as applicable]**.
Brief description of change(s): _____
_____

ITEM DESCRIPTION	PRIME CONTRACTOR	SUB 1	SUB 2	SUB 3	SUB 4	TOTAL
17. **LABOR**						
18. **EQUIPMENT**	19.	20.	21.	22.	23.	24.
25. **MATERIAL**	26.	27.	28.	29.	30.	31.
32. **TOTAL DIRECT COST OF CONSTRUCTION (LEM)**	33.	34.	35.	36.	37.	38.
39. **MARKUP FOR PRIME CONTRACTOR'S SELF-PERFORMED WORK (15%)**						
40. **MARKUP FOR SUBCONTRACTOR-PERFORMED WORK (20%)**						
41. **BONDS, INSURANCE AND TAXES**						
42. **GRAND TOTAL**						
43. **REQUESTED CHANGE IN CONTRACT TIME (DAYS)** (Time Impact Evaluation Enclosed)						

_____
By Contractor: Signature: Date:

DIVISION 1 GENERAL REQUIREMENTS

SECTION 01 3119

PROJECT MEETINGS

PART 1 – GENERAL

1.01 SUMMARY

A. Section includes description of required project meetings.

1.02 PRECONSTRUCTION CONFERENCE

A. Preconstruction Conference. Owner will call for and administer Preconstruction Conference at time and place to be announced (usually the week prior to start of Work at the Site). Contractor, all major Subcontractors, and major suppliers shall attend Preconstruction Conference. Agenda may include, without limitation, the following items:

1. Schedules
2. Personnel and vehicle permit procedures
3. Use of premises
4. Location of the Contractor's on-Site facilities
5. Security
6. Housekeeping
7. Submittal and RFI procedures
8. Inspection and testing procedures, on-Site and off-Site
9. Utility shutdown procedures
10. Control and reference point survey procedures
11. Injury and Illness Prevention Program
12. Contractor's Initial Progress Schedule
13. Contractor's Schedule of Values
14. Contractor's Schedule of Submittals
15. Jurisdictional agency requirements
16. Owner will distribute copies of minutes to attendees. Attendees shall have seven Days to submit comments or additions to minutes. Minutes will constitute final memorialization of results of Preconstruction Conference.

1.03 WEEKLY PROJECT MEETINGS

A. Owner will schedule and administer weekly progress meetings throughout duration of Work. Progress meetings will be held weekly unless otherwise directed by Owner. Meetings shall be held at Owner's Offices unless otherwise specified in Contract Documents.

1. Owner's Representative will prepare agenda and distribute it four Days in advance of meeting to Contractor.
2. Participants with agenda items shall present them.
3. The Architect/Engineer and other responsible entities shall attend meetings unless otherwise specified in Contract Documents or provided by Owner.
4. Owner shall record and distribute the meeting minutes. Minutes shall be distributed by the Owner to the Contractor within three business days after the meeting. Contractor shall distribute the minutes to those affected by decisions made at meeting. Attendees shall have five business days to submit comments or additions to the minutes. Minutes shall constitute final memorialization of results of meeting.
5. Progress meetings shall be attended by Contractor's job superintendent, major Subcontractors and suppliers, Owner, and others as appropriate to agenda topics for each meeting.
6. Agenda may contain the following items, as appropriate:

a. Review, revise as necessary, and approve previous meeting minutes
b. Review of Work progress since last meeting
c. Status of Construction Work Schedule, delivery schedules, adjustments
d. Submittal, RFI, and Change Order status
e. Review of the Contractor's safety program activities and results, including report on all serious injury and/or damage accidents
f. Other items affecting progress of Work

1.04 PROGRESS SCHEDULE AND BILLING MEETINGS

A. A meeting will be held on approximately the 20th of each month to review the schedule update submittal and progress payment application.

B. At this meeting, at a minimum, the following items will be reviewed:

1. Percent complete of each activity;
2. Time impact evaluations for Change Orders and Time Extension Request;
3. Actual and anticipated activity sequence changes;
4. Actual and anticipated duration changes; and
5. Actual and anticipated Contractor delays.

C. These meetings are considered a critical component of overall monthly schedule update submittal and Contractor shall have appropriate personnel attend. At a minimum, Contractor's General Superintendent and Scheduler shall attend these meetings.

PART 2 – PRODUCTS – NOT USED

PART 3 – EXECUTION – NOT USED

END OF SECTION

DIVISION 1 GENERAL REQUIREMENTS

SECTION 01 3200

PROGRESS SCHEDULES AND REPORTS

PART 1 – GENERAL

1.01 SUMMARY

A. Section includes description of requirements and procedures for submitting progress schedules and submittals.

1.02 CONTRACTOR TO SUBMIT BASELINE AND PROGRESS SCHEDULES

A. Contractor shall submit an Initial Contract Schedule two weeks prior to the first Application for Payment. Contractor's Initial Contract Schedule is subject to Owner's review and comments. The approved Initial Contract Schedule shall be referred to as the **Baseline Schedule**.

B. Contractor's Baseline Schedule and progress schedules shall show Contractor's construction and procurement activities including, without limitation, equipment procurement and delivery (Contractor and Owner supplied), activities with Subcontractors and suppliers, major submittal reviews, commissioning of systems, use of major equipment on site, and necessary interface with Owner and third parties required to complete the Work in a timely manner and in accordance with Contract Time.

1.03 SCHEDULE REQUIREMENTS.

A. Unless Owner agrees in writing otherwise, progress schedule shall be on Primavera P6, most current version of Sure Track, or equivalent software acceptable to Owner, as Owner may specify, which Contractor shall prepare and supply to Owner, with all datapoint entries completed for start dates, necessary work activities, durations (not longer than 21 calendar days), and logic ties.

B. Contractor shall develop a network plan and schedule for the Project demonstrating complete fulfillment of all Contract requirements, shall keep the network plans up to date in accordance with the requirements of this Section 01 3200, and shall utilize the Critical Path Method (**CPM**) in planning, coordinating, performing and reporting the work under this contract, including all activities of Subcontractors, equipment vendors, and suppliers, and in assisting Owner in monitoring the progress of the Work.

C. CPM network is a graphic depiction of the Contractor's construction plan, showing the sequential steps needed to reach completion of the Work within the prescribed Contract Time. It shall depict events and tasks as activities, and their interrelationships, and shall recognize the progress that must be made on one activity before subsequent activities can begin. These activities shall be logically represented in a CPM network showing their interrelationships in a chronological fashion. As each activity has a time allocation, the completed network shall show the critical path of activities that must be completed on time if the entire Project is not to be delayed. It shall also be possible to identify the earliest and latest start and finish times for each activity if the overall Project is not to be delayed. Therefore, the CPM network shall be comprehensive and shall include all interdependencies and interactions required to perform the Work of the Project.

D. Contractor's Baseline Schedule and progress schedules shall be in the form of a CPM (arrow) diagram. Contractor shall provide Owner with native format electronic schedules and hard copies of the Baseline Schedule, schedule updates, and lookahead schedules. All electronic and hard copies of the schedule that Contractor provides to Owner shall indicate the critical path of the Work (in red) and shall show a logical progression of the Work through ***[Substantial and Final]*** completion within Contract Time.

E. Unless Owner agrees in writing otherwise, progress schedules shall also show early and late start and finish dates and total available float (float to the successor activity's late start date) for each activity.

F. Owner has no obligation to accept an early completion schedule.

1.04 MONTHLY UPDATES

A. Contractor's progress schedule shall be updated monthly to reflect actual progress. The schedule shall be subject to Owner's review and acceptance for use in monitoring Contractor's Work and evaluating Applications for Payment.

B. Contractor shall supply Owner with an electronic copy of the updated progress schedule with each monthly payment application. Contractor shall provide Owner with two-week lookahead schedules weekly, showing in detail and activities and resources scheduled for the immediate two week period.

1.05 RECOVERY SCHEDULE

A. Owner may request a recovery schedule should Contractor fall 21 or more Days behind any schedule Milestone, which schedule shall show Contractor's plan and resources committed to retain Contract completion dates.

B. The recovery schedule shall show the intended critical path. If Owner requests, Contractor shall also:

1. Secure and demonstrate appropriate Subcontractor and supplier consent to the recovery schedule.
2. Submit a written plan and narrative explaining on trade flow and construction flow changes and man-hour loading assumptions for major Work activities and/or Subcontractors.

1.06 TIME IMPACT EVALUATION (TIE) FOR CHANGE ORDERS, TIME EXTENSIONS AND DELAYS

A. When Contractor requests a time extension for any reason, Contractor shall submit a TIE, in accordance with Article 11 of Document 00 7200 and Section 01 2600, Article 1.02.C that provides information justifying the request and stating the extent of the adjustment requested for each specific change or alleged delay. Each TIE shall be in a form and content that is acceptable to Owner and that includes both a written narrative and a schedule diagram depicting how the changed Work or other impact affects other schedule activities. The schedule diagram shall show how Contractor proposes to incorporate the changed Work or other impact in the schedule and how it impacts the current Schedule update critical path or otherwise. Contractor is also responsible for establishing time extensions based on the TIE's impact on the critical path. The diagram shall be tied to the main sequence of scheduled activities to enable Owner to evaluate the impact of changed Work to the scheduled critical path.

B. Contractor is responsible for all costs associated with preparing TIE's, and the process of incorporating TIE's into the current schedule update. Contractor shall provide Owner with four copies of each TIE.

PART 2 – PRODUCTS – NOT USED

PART 3 – EXECUTION – NOT USED

END OF SECTION

DIVISION 1 GENERAL REQUIREMENTS

SECTION 01 3300

SUBMITTALS

PART 1 – GENERAL

1.01 SUMMARY

A. Section includes description of requirements and procedures for submittals.

1.02 SCHEDULE OF SUBMITTALS

A. Contractor shall prepare for Owner's review and acceptance prior to commencement of work on the Site, for purposes of contract administration, a schedule of submittals (also referred to as a submittal register) required to complete the Work, prepared by Contractor and accepted by Owner for contract administration. Schedule of submittals shall include, for each submittal: the specification or drawing reference requiring the submittal, if applicable; the material, item, or process for which the submittal is required; the submittal number and identifying title of the submittal; the Contractor's anticipated submission date and the approval need date.

B. Contractor shall update monthly the schedule of submittals to reflect actual submission and acceptance dates for submittals. Review by Owner of schedule of submittals does not excuse Contractor of obligation to supply, schedule and coordinate all submittals required by the Contract Documents.

1.03 CONTRACTOR TO SUBMIT SHOP DRAWINGS, PRODUCT DATA AND SUBMITTALS.

A. Contractor shall review for compliance with Contract Documents, approve and submit to Owner Shop Drawings, Product Data, Samples and similar submittals required by Contract Documents.

B. Contractor shall schedule and submit concurrently submittals covering component items forming a system or items that are interrelated. Contractor shall include certifications to be submitted with the pertinent drawings at the same time.

C. Contractor shall coordinate scheduling, sequencing, preparing and processing of all submittals with performance of work so that work will not be delayed by submittal processing.

D. Submittals shall specifically identify any Work depicted that does not conform to the Contract Documents.

1.04 OWNER REVIEW OF SHOP DRAWINGS, PRODUCT DATA AND SUBMITTALS.

A. After review by Owner of each Submittal, material will be returned to Contractor with actions defined as follows:

1. NO EXCEPTIONS TAKEN - Accepted subject to its compatibility with general design concept of the Work, future Submittals and additional partial Submittals for any portions of the Work not covered in this Submittal. Does not constitute acceptance or deletion of specified or required items not shown on the Submittal.
2. MAKE CORRECTIONS NOTED (NO RESUBMISSIONS REQUIRED) - Same as item 1 above, except that minor corrections as noted shall be made by Contractor.
3. REVISE AS NOTED AND RESUBMIT - Rejected because of major inconsistencies or errors that shall be resolved or corrected by Contractor prior to subsequent review by Owner.
4. REJECTED - RESUBMIT - Submitted material does not conform to Drawings and/or

Specifications in major respect, i.e.: wrong size, model, capacity, or material.

B. Owner's review will not constitute acceptance by Owner of any responsibility for the accuracy, coordination, or completeness of the Submittals. Accuracy, coordination, and completeness of Submittals shall be Contractor's sole and exclusive responsibility including responsibility to back-check comments, corrections, and modifications from Owner's review before fabrication. Contractor, Subcontractors, or suppliers may prepare Submittals. Contractor submission of any Submittal is a representation that Contractor has confirmed that the Submittal meets requirements of Contract Documents including, without limitation, conforming to structural space and access conditions at point of installation. Owner's review will be only to assess if the items covered by the Submittals will, after installation or incorporation in the Work, conform to the information given in the Contract Documents and be compatible with the design concept of the completed Project as indicated by the Contract Documents. Owner's review of Submittal, method of Work, or information regarding materials and equipment Contractor proposes to furnish shall not relieve Contractor of responsibility for errors therein and shall not be regarded as assumption of risks or liability by Owner, or any officer or employee thereof. Contractor shall have no claim under Contract Documents on account of failure or partial failure or inefficiency or insufficiency of any plan or method of Work or material and equipment so accepted. Owner's review shall be considered to mean merely that Owner has no objection to Contractor using, upon Contractor's own full responsibility, plan or method of Work proposed, or furnishing materials and equipment proposed.

C. Unless otherwise specified, Owner's review will not extend to the means, methods, techniques, sequences, or procedures of construction or to safety precautions or programs incident thereto. The review and approval of a separate item as such will not indicate approval of the assembly in which the item functions.

D. Contractor shall perform no portion of the Work for which the Contract Documents require submittal and review of Shop Drawings, Product Data, Samples or similar submittals until the Owner has reviewed respective Submittal and the Work described in the Submittal is authorized to proceed in accordance with paragraphs 1.04.A.1 or 2, above. Otherwise, any such Work is at Contractor's sole risk for removal and replacement, at Owner's sole discretion, and at Contractor's sole expense.

44. **PART 2 – PRODUCTS – NOT USED**

45. **PART 3 – EXECUTION – NOT USED**

END OF SECTION

DIVISION 1 GENERAL REQUIREMENTS

SECTION 01 4100

REGULATORY REQUIREMENTS

PART 1 – GENERAL

1.01 SUMMARY

A. **Section includes:**

1. Regulatory requirements applicable to Contract Documents
2. Required provisions under Local Agency Disputes Act
3. Required references under federal law

1.02 GENERAL

A. **Compliance with Laws**

1. Conform to all applicable codes, laws, ordinances, rules and regulations, which shall have full force and effect as though printed in full in these Specifications. Codes, laws, ordinances, rules, regulations and ordinances (**Regulatory Requirements**) are not furnished to Contractor, because Contractor is assumed to be familiar with these requirements.
2. Any listing of Regulatory Requirements for hazardous waste abatement Work in the Contract Documents is supplied to Contractor as a courtesy and shall not limit Contractor's responsibility for complying with all applicable Regulatory Requirements having application to the Work. Where conflict among the Regulatory Requirements or with these Specifications occurs, the most stringent requirements shall be used.
3. Specific reference in the Specifications to codes and regulations or requirements of regulatory agencies shall mean the latest printed edition of each adopted by the regulatory agency in effect at the time of the opening of Bids, except as may be otherwise specifically stated in the Contract Documents.
4. **Contractor shall comply with San Mateo County- Hazardous Material Program and Bay Area Air Quality Management District. Contractor shall Submit the HAZARDOUS WASTE TANK CLOSURE CERTIFICATION form and obtain required permits for the removal of the existing fuel tank and generator and the installation of new equipment.**

B. **Precedence**

1. Where specified requirements differ from Regulatory Requirements, the more stringent requirements shall take precedence. Where Drawings or Specifications require or describe products or execution of better quality, higher standard or greater size than required by Regulatory Requirements, then Drawings and Specifications shall take precedence so long as such increase is legal. Where no requirements are identified on Drawings or in Specifications, comply with all Regulatory Requirements of governing authorities having jurisdiction.
2. Should any conditions develop not covered by the Contract Documents wherein the finished Work will not comply with current codes, a Change Order detailing and specifying the required Work shall be submitted to and approved by Owner before proceeding with the Work.

1.03 REGULATORY REQUIREMENTS

A. **Applicable Codes**

1. Codes that apply to Contract Documents include all Codes applicable to construction, including**, WITHOUT LIMITATION,** the following:

a. California Building Code (2013 Edition or latest applicable code) as amended by applicable local ordinances for all construction work.
b. California Electrical Code (2013 Edition or latest applicable code) as amended by applicable local ordinances for all construction work.
c. California Plumbing Code (2013 Edition or latest applicable code) as amended by applicable local ordinances for plumbing, sewage disposal and health requirements.
d. California Mechanical Code (2013 Edition or latest applicable code) as amended by applicable local ordinances for all construction work.
e. California Fire Code (2013 Edition or latest applicable code) as amended by applicable local ordinances for all construction work.
f. California Administrative Code Titles 15, 19 and 24 (with California amendments), and Americans with Disabilities Act (ADA) accessibility guidelines, whichever is more stringent.
g. All State laws and city/town and County Ordinances, rules of the State or city/town or County Health Departments, rules of the National Board of Fire Underwriters and National Fire Protection Associations, and local power company regulations for mechanical and electrical work.

B. **Applicable Laws, Statutes, Ordinances, Rules, And Regulations**

1. During prosecution of Work to be done under Contract Documents, Contractor shall comply with applicable laws, ordinances, rules and regulations including, without limitation, the following:

a. <u>Federal:</u>

1) Americans With Disabilities Act of 1990
2) 29 CFR, Section 1910.1001, Asbestos
3) 40 CFR, Subpart M, National Emission Standards for Asbestos
4) Executive Order 11246
5) Federal Endangered Species Act
6) Clean Water Act

b. <u>State of California:</u>

1) Code of Regulations, Titles 5, 8, 17, 19, 21, 22, 24 and 25
2) Public Contract Code
3) Health and Safety Code
4) Government Code
5) Labor Code
6) Civil Code
7) Code of Civil Procedure
8) CPUC General Order 95, Rules for Overhead Electric Line Construction
9) CPUC General Order 128, Rules for Construction of Underground Electric Supply and Communications Systems
10) Cal/OSHA
11) OSHA: Hazard Communications Standards
12) California Endangered Species Act
13) Water Code
14) Fish and Game Code

c. <u>State of California Agencies:</u>

1) State and Consumer Services Agency
2) Office of the State Fire Marshall
3) Office of Statewide Health Planning and Development (if applicable)
4) Department of Fish and Game
5) All Air Quality Management Districts with jurisdiction
6) All Regional Water Quality Control Boards with jurisdiction

7) Division of the State Architect (if applicable)

d. <u>All Local Agencies with jurisdiction (cities, counties, fire departments)</u>

C. **Change Orders and Claims:**

1. The Public Contract Code including, without limitation, Section 7105(d)(2), and the California Government Code Section 930.2, et seq., apply to all contract procedures for changes, time extensions, change orders (time or compensation) and claims. Federal law (*U.S. v. Holpuch* 326 U.S. 234) shall supplement California law on the enforceability of these requirements.
2. Any change, waiver, or omission to implement contract change order and claim procedures shall have no legal effect unless expressly permitted in a fully executed change order approved by Contractor and Owner and approved as to form by their respective legal counsel.

D. **Required Provisions On Contract Claim Resolution**

Any claim arising under this contract which the Contractor wishes to assert against Owner shall be governed by California Public Contract Code Section 9204. Claims which do not exceed three hundred seventy-five thousand dollars **($375,000)** are also subject to the provisions of Article 1.5 of the California Public Contract Code (commencing with Section 20104). Pursuant to California Public Contracts Code Section 9204, claims shall be resolved as follows:

(d) (1) (A) Upon receipt of a claim pursuant to this section, the public entity to which the claim applies shall conduct a reasonable review of the claim and, within a period not to exceed 45 days, shall provide the claimant a written statement identifying what portion of the claim is disputed and what portion is undisputed. Upon receipt of a claim, a public entity and a contractor may, by mutual agreement, extend the time period provided in this subdivision.

(B) The claimant shall furnish reasonable documentation to support the claim, pursuant to Document 00 7200 (General Conditions), Article 12.

(C) If the public entity needs approval from its governing body to provide the claimant a written statement identifying the disputed portion and the undisputed portion of the claim, and the governing body does not meet within the 45 days or within the mutually agreed to extension of time following receipt of a claim sent by registered mail or certified mail, return receipt requested, the public entity shall have up to three days following the next duly publicly noticed meeting of the governing body after the 45-day period, or extension, expires to provide the claimant a written statement identifying the disputed portion and the undisputed portion.

(D) Any payment due on an undisputed portion of the claim shall be processed and made within 60 days after the public entity issues its written statement. If the public entity fails to issue a written statement, paragraph (3) shall apply.

(2) (A) If the claimant disputes the public entity's written response, or if the public entity fails to respond to a claim issued pursuant to this section within the time prescribed, the claimant may demand in writing an informal conference to meet and confer for settlement of the issues in dispute. Upon receipt of a demand in writing sent by registered mail or certified mail, return receipt requested, the public entity shall schedule a meet and confer conference within 30 days for settlement of the dispute.

(B) Within 10 business days following the conclusion of the meet and confer conference, if the claim or any portion of the claim remains in dispute, the public entity shall provide the claimant a written statement identifying the portion of the claim that remains in dispute and the portion that is undisputed. Any payment due on an undisputed portion of the claim shall

be processed and made within 60 days after the public entity issues its written statement. Any disputed portion of the claim, as identified by the contractor in writing, shall be submitted to nonbinding mediation, with the public entity and the claimant sharing the associated costs equally. The public entity and claimant shall mutually agree to a mediator within 10 business days after the disputed portion of the claim has been identified in writing. If the parties cannot agree upon a mediator, each party shall select a mediator and those mediators shall select a qualified neutral third party to mediate with regard to the disputed portion of the claim. Each party shall bear the fees and costs charged by its respective mediator in connection with the selection of the neutral mediator. If mediation is unsuccessful, the parts of the claim remaining in dispute shall be subject to applicable procedures outside this section.

(C) For purposes of this section, mediation includes any nonbinding process, including, but not limited to, neutral evaluation or a dispute review board, in which an independent third party or board assists the parties in dispute resolution through negotiation or by issuance of an evaluation. Any mediation utilized shall conform to the timeframes in this section.

(D) Unless otherwise agreed to by the public entity and the contractor in writing, the mediation conducted pursuant to this section shall excuse any further obligation under Section 20104.4 to mediate after litigation has been commenced.

(E) This section does not preclude a public entity from requiring arbitration of disputes under private arbitration or the Public Works Contract Arbitration Program, if mediation under this section does not resolve the parties' dispute.

(3) Failure by the public entity to respond to a claim from a contractor within the time periods described in this subdivision or to otherwise meet the time requirements of this section shall result in the claim being deemed rejected in its entirety. A claim that is denied by reason of the public entity's failure to have responded to a claim, or its failure to otherwise meet the time requirements of this section, shall not constitute an adverse finding with regard to the merits of the claim or the responsibility or qualifications of the claimant.

(4) Amounts not paid in a timely manner as required by this section shall bear interest at 7 percent per annum.

(5) If a subcontractor or a lower tier subcontractor lacks legal standing to assert a claim against a public entity because privity of contract does not exist, the contractor may present to the public entity a claim on behalf of a subcontractor or lower tier subcontractor. A subcontractor may request in writing, either on his or her own behalf or on behalf of a lower tier subcontractor, that the contractor present a claim for work which was performed by the subcontractor or by a lower tier subcontractor on behalf of the subcontractor. The subcontractor requesting that the claim be presented to the public entity shall furnish reasonable documentation to support the claim. Within 45 days of receipt of this written request, the contractor shall notify the subcontractor in writing as to whether the contractor presented the claim to the public entity and, if the original contractor did not present the claim, provide the subcontractor with a statement of the reasons for not having done so.

A waiver of the rights granted by this section is void and contrary to public policy, provided, however, that (1) upon receipt of a claim, the parties may mutually agree to waive, in writing, mediation and proceed directly to the commencement of a civil action or binding arbitration, as applicable; and (2) a public entity may prescribe reasonable change order, claim, and dispute resolution procedures and requirements in addition to the provisions of this section, so long as the contractual provisions do not conflict with or otherwise impair the timeframes and procedures set forth in this section.

Nothing in this section shall impose liability upon a public entity that makes loans or grants available through a competitive application process, for the failure of an awardee to meet its contractual obligations.

E. **Compliance With Americans With Disabilities Act**

1. Contractor acknowledges that, pursuant to the Americans with Disabilities Act (**ADA**), programs, services and other activities provided by a public entity to the public, whether directly or through a Contractor, must be accessible to the disabled public. Contractor shall provide the services specified in the Contract Documents in a manner that complies with the ADA and any and all other applicable federal, state and local disability rights legislation. Contractor agrees not to discriminate against disabled persons in the provision of services, benefits or activities provided under the Contract Documents and further agrees that any violation of this prohibition on the part of Contractor, its employees, agents or assigns shall constitute a material breach of the Contract Documents.

F. **Compliance With IRCA**

1. Contractor acknowledges that Contractor, and all subcontractors hired by Contractor to perform services under this Agreement, are aware of and understand the Immigration Reform and Control Act (**IRCA**). Contractor is and shall remain in compliance with the IRCA and shall ensure that any subcontractors hired by Contractor to perform services under this Agreement are in compliance with the IRCA. In addition, Contractor agrees to indemnify, defend and hold harmless Owner, its agents, officers and employees, from any liability, damages or causes of action arising out of or relating to any claims that Contractor's employees, or employees of any subcontractor hired by Contractor, are not authorized to work in the United States for Contractor or its subcontractor and/or any other claims based upon alleged IRCA violations committed by Contractor or Contractor's subcontractors.

PART 2 – PRODUCTS – NOT USED

PART 3 – EXECUTION – NOT USED

END OF SECTION

DIVISION 1 GENERAL REQUIREMENTS

SECTION 01 4200

REFERENCES AND DEFINITIONS

PART 1 - GENERAL

1.01 SUMMARY

A. **Section Includes:**

1. Reference standards, abbreviations, symbols, and definitions used in Contract Documents.
2. Full titles are given in this Section for standards cited in other Sections of Specifications.

1.02 REFERENCE TO STANDARDS AND SPECIFICATIONS OF TECHNICAL SOCIETIES; REPORTING AND RESOLVING DISCREPANCIES

A. **References**

1. Reference to standards, specifications, manuals, or codes of any technical society, organization, or association, or to the laws or regulations of any governmental authority, whether such reference be specific or by implication, shall mean the latest standard, specification, manual, code, or laws or regulations in effect at the time of opening of Bids, except as may be otherwise specifically stated in the Contract Documents.
2. If during the performance of the Work, Contractor discovers any conflict, error, ambiguity, or discrepancy within the Contract Documents or between the Contract Documents and any provision of any such law or regulation applicable to the performance of the Work or of any such standard, specification, manual, or code or of any instruction of any supplier, Contractor shall report it in writing at once to Owner's Representative and Architect/Engineer, and Contractor shall not proceed with the Work affected thereby until consent to do so is given by Owner.

B. **Precedence**

1. Except as otherwise specifically stated in the Contract Documents or as may be provided by Change Order, CCD, or Supplemental Instruction, the provisions of the Contract Documents shall take precedence in resolving any conflict, error, ambiguity, or discrepancy between the provisions of the Contract Documents and:
   a. The provisions of any such standard, specification, manual, code, or instruction (whether or not specifically incorporated by reference in the Contract Documents); or
   b. The provisions of any such laws or regulations applicable to the performance of the Work (unless such an interpretation of the provisions of the Contract Documents would result in violation of such law or regulation).
2. No provision of any such standard, specification, manual, code, or instruction shall be effective to change the duties and responsibilities of Owner, Owner's Representative, Architect/Engineer or Contractor, or any of their subcontractors, consultants, agents, or employees, from those set forth in the Contract Documents, nor shall it be effective to assign to Owner, Architect/Engineer, or any of their consultants, agents, representatives or employees any duty or authority to supervise or direct the furnishing or performance of the Work or any duty or authority to undertake responsibility inconsistent with the provisions of the Contract Documents.

C. **Referenced Grades, Classes, and Types:**

1. Where an alternative or optional grade, class, or type of product or execution is included in a reference but is not identified in Drawings or in Specifications, provide the highest, best, and greatest of the alternatives or options for the intended use and prevailing conditions.

D. **Edition Date of References:**

1. When an edition or effective date of a reference is not given, it shall be understood to be the current edition or latest revision published as of the date of opening Bids.
2. All amendments, changes, errata and supplements as of the effective date shall be included.

E. **ASTM and ANSI References:** Specifications and Standards of the American Society for Testing and Materials (ASTM) and the American National Standards Institute (ANSI) are identified in the Drawings and Specifications by abbreviation and number only and may not be further identified by title, date, revision, or amendment. It is presumed that Contractor is familiar with and has access to these nationally- and industry-recognized specifications and standards.

1.03 DEFINITIONS

A. **Meaning of Words and Phrases**

Wherever any of the words or phrases defined below, or a pronoun used in place thereof, is used in any part of the Contract Documents, it shall have the meaning here set forth. Where abbreviations and symbols are used, such abbreviations and symbols shall be given their common meaning in the construction industry. In the Contract Documents, the neuter gender includes the feminine and masculine, and the singular number includes the plural.

While Owner has made an effort to identify all defined terms with initial caps, the following definitions shall apply regardless of case unless the context otherwise requires:

1. Addenda: Written or graphic instruments issued prior to the opening of Bids, which clarify, correct, or change the bidding requirements or the Contract Documents. Addenda shall not include the minutes of the Pre-Bid Conference and/or Site Visit.
2. Agreement (Document 00 5200): Agreement is the basic Contract Document that binds the parties to construction Work. Agreement defines relationships and obligations between Owner and Contractor and by reference incorporates Conditions of Contract, Drawings, and Specifications and contains Addenda and all Modifications subsequent to execution of Contract Documents.
3. Alternate: Work added to or deducted from the base Bid, if accepted by Owner.
4. Application for Payment: Written application for monthly or periodic progress or final payment made by Contractor complying with the Contract Documents.
5. Approved Equal: Approved in writing by Owner as being of equivalent quality, utility and appearance.
6. Architect/Engineer: If used elsewhere in the Contract Documents, “Architect/Engineer” shall mean a person (or that person’s firm) holding a valid California State Architect’s or Engineer’s license representing the Owner in the administration of the Contract Documents. Architect/Engineer may be an employee of or an independent consultant to Owner. When Architect/Engineer is referred to within the Contract Documents and not an employee of Owner, Architect/Engineer shall be construed to include employees of Architect/Engineer and/or employees that Architect/Engineer supervises. When the designated Architect/Engineer is an employee of Owner, his or her authorized representatives on the Project will be included under the term Architect/Engineer. If Architect/Engineer is an employee of Owner, Architect/Engineer is the beneficiary of all Contractor obligations to Owner, including without limitation, all releases and indemnities. Architect/Engineer may also be referred to as Architect or Engineer.

7. Asbestos: Any material that contains more than one percent asbestos and is friable or is releasing asbestos fibers into the air above current action levels established by OSHA or Cal/OSHA.
8. Bid: The offer or proposal of the Bidder submitted on the prescribed form(s) setting forth the prices for the Work to be performed.
9. Bidder: One who submits a Bid.
10. Bidding Documents: All documents comprising the Project Manual (including all documents and Specification Sections listed in Document 00 0110 [Table of Contents]), including documents supplied for bidding purposes only and Contract Documents.
11. Board: The governing body of the Owner.
12. Business Day: Any Day other than Saturday, Sunday, and the following days that have been designated as holidays by Owner. If a holiday falls on a Saturday, the preceding Friday will be the holiday. If a holiday falls on a Sunday, the following Monday will be the holiday.

    a. New Year's Day, January 1;
    b. Martin Luther King Jr.'s Birthday, third Monday in January;
    c. Lincoln's Birthday, February 12;
    d. Presidents' Day, third Monday in February;
    e. Memorial Day, last Monday in May;
    f. Independence Day, July 4;
    g. Labor Day, first Monday in September;
    h. Veterans' Day, November 11;
    i. Thanksgiving Day, as designated by the President;
    j. The Day following Thanksgiving Day;
    k. Christmas Day, December 25; and
    l. Each day appointed by the Governor of California and formally recognized by the Governing Board as a day of mourning, thanksgiving, or special observance.
13. By Owner: Work that will be performed by Owner or its agents at the Owner's expense.
14. By Others: Work that is outside scope of Work to be performed by Contractor under this Contract, which will be performed by Owner, other contractors, or other means.
15. Change Order: A written instrument prepared by Owner and signed by Owner and Contractor, stating their agreement upon all of the following:

    a. a change in the Work;
    b. the amount of the adjustment in the Contract Sum, if any; and
    c. the amount of the adjustment in the Contract Time, if any.
16. Code Inspector: A local or state agency responsible for the enforcement of applicable codes and regulations.
17. Concealed: Work not exposed to view in the finished Work, including within or behind various construction elements.
18. Construction Change Directive (**CCD**): A written order prepared and signed by Owner, directing a change in the Work and stating a proposed basis for adjustment, if any, in the Contract Sum or Contract Time, or both.
19. Contract Amount: a change order price, line item price, Contract Sum, or other price assigned to a scope of work.
20. Contract Conditions or Conditions of the Contract: Consists of two parts: General Conditions and Supplementary Conditions.

    a. General Conditions are general clauses that are common to the Owner Contracts, including Document 00 7200 (General Conditions).
    b. Supplementary Conditions modify or supplement General Conditions to meet specific requirements for Contract Documents, including Documents 00 7300, *et seq.* (Supplementary Conditions).

21. Contract Documents and Contract: Contract Documents and Contract shall consist of the documents identified as the Contract Documents in Document 00 5200 (Agreement), plus all changes, Addenda, and modifications thereto.

22. Contract Modification: Either:

    a. a written amendment to Contract signed by Contractor and Owner; or
    b. a Change Order; or
    c. a Construction Change Directive; or
    d. a written directive for a minor change in the Work issued by Owner.

23. Contract Sum: The sum stated in the Agreement and, including authorized adjustments, the total amount payable by Owner to Contractor for performance of the Work and the Contract Documents. The Contract Sum is also sometimes referred to as the Contract Price or the Contract Amount.

24. Contract Time: The number or numbers of Days or the dates stated in the Agreement to achieve Substantial Completion of the Work or designated Milestones; and/or to achieve Final Completion of the Work so that it is ready for final payment and is accepted.

25. Contractor: The person or entity identified as such in the Agreement and referred to throughout the Contract Documents as if singular in number and neutral in gender. The term "Contractor" means the Contractor or its authorized representative.

26. Contractor's Employees: Persons engaged in execution of Work under Contract as direct employees of Contractor, as Subcontractors, or as employees of Subcontractors.

27. County: The County in which Owner is located.

28. Day: One calendar day of 24 hours measured from midnight to the next midnight, unless the word "day" is specifically modified to the contrary.

29. Defective: An adjective which, when modifying the word "Work," refers to Work that is unsatisfactory or unsuited for the use intended, faulty, or deficient, that does not conform to the Contract Documents, or does not meet the requirements of any inspection, reference standard, test or approval referred to in the Contract Documents (including, without limitation, approval of Samples and "or equal" items), or has been damaged prior to final payment (unless responsibility for the protection thereof has been assumed by Owner). Unapproved substitutions are defective. Owner is the judge of whether Work is Defective.

30. Drawings: The graphic and pictorial portions of Contract Documents, wherever located and whenever issued, showing the design, location and dimensions of the Work, generally including plans, elevations, sections, details, schedules, and diagrams.

31. Equal: Equal in opinion of Owner. Burden of proof of equality is responsibility of Contractor.

32. Final Acceptance or Final Completion: Owner's acceptance of the Work as satisfactorily completed in accordance with Contract Documents. Requirements for Final Acceptance/Final Completion include, but are not limited to:

    a. Final cleaning is completed.
    b. All systems having been tested and accepted as having met requirements of Contract Documents.
    c. All required instructions and training sessions having been given by Contractor.
    d. All Project Record Documents having been submitted by Contractor, reviewed by Owner, and accepted by Owner.
    e. All punch list Work, as directed by Owner, having been completed by Contractor.
    f. Generally all Work, except Contractor maintenance after Final Acceptance/Final Completion, having been completed to satisfaction of Owner.

33. Force Account: Work directed to be performed without prior agreement as to lump sum or unit price cost thereof, and which is to be billed at cost for labor, materials, equipment, taxes, and other costs, plus a specified percentage for overhead and profit.

34. Exposed: Work exposed to view in the finished Work, including behind louvers, grilles, registers and various other construction elements.

35. Furnish: Supply only, do not install.
36. Indicated: Shown or noted on the Drawings.
37. Install: Install or apply only, do not furnish.
38. Latent: Not apparent by reasonable inspection including, without limitation, the inspections and research required as a condition to bidding under Document 00 7200 (General Conditions).
39. Law: Unless otherwise limited, all applicable laws including without limitation all federal, state, and local laws, statutes, standards, rules, regulations, ordinances, and judicial and administrative decisions.
40. Material: This word shall be construed to embrace machinery, manufactured articles, materials of construction (fabricated or otherwise), and any other classes of material to be furnished in connection with Contract, except where a more limited meaning is indicated by context.
41. Milestone: A principal event specified in Contract Documents relating to an intermediate completion date or time prior to Substantial Completion of all Work.
42. Modification: Same as Contract Modification.
43. Not in Contract or "NIC": Work that is outside the scope of Work to be performed by Contractor under Contract Documents.
44. Notice of Completion: Shall have the meaning provided in California Civil Code Section 9202, and any successor statute.
45. Off Site: Outside geographical location of the Project.
46. Owner: Owner is defined in Document 00 5200 (Agreement).
47. Owner-Furnished, Contractor Installed: Items furnished by Owner at its cost for installation by Contractor at its cost under Contract Documents.
48. Owner's Representative(s): See Document 00 5200 (Agreement).
49. Partial Utilization: Use by Owner of a substantially completed part of the Work for the purpose for which it is intended (or a related purpose) prior to Substantial Completion of all of the Work.
50. PCBs: Polychlorinated biphenyls.
51. Phase: A specified portion of the Work (if any) specifically identified as a Phase in Document 00 5200 (Agreement) or Section 01 1100 (Summary).
52. Product Data: That information (brochures, catalog sheets, manufacturer's cut sheets, etc.) supplied by vendors having technical and commercial characteristics of the supplied equipment or materials and accompanying commercial terms such as warranties, instructions, and manuals.
53. Progress Report: A periodic report submitted by Contractor to Owner with progress payment invoices accompanying progress schedule. See Document 00 7200 (General Conditions).
54. Project: Total construction of which Work performed under Contract Documents may be whole or part.
55. Project Manual: Project Manual consists of Bidding Requirements, Agreement, Bonds, Certificates, Contract Conditions, Drawings, and Specifications.
56. Project Record Documents: All Project deliverables required under the Contract Documents, including without limitation, as built drawings; Installation, Operation, and Maintenance Manuals; and Machine Inventory Sheets.
57. Proposal: A Bid.
58. Provide: Furnish and install.
59. Request for Information (**RFI**): A document prepared by Contractor requesting information regarding the Project or Contract Documents. The RFI system is also a means for Owner to submit Contract Document clarifications or supplements to Contractor.

60. Request for Proposals (**RFP**): A document issued by Owner to Contractor whereby Owner may initiate changes in the Work or Contract Time as provided in Contract Documents.

61. Request for Substitution (**RFS**): A document prepared by Contractor requesting substitution of materials as permitted and to the extent permitted in Contract Documents.

62. RFI-Reply: A document consisting of supplementary details, instructions, or information issued by Owner that clarifies or supplements Contract Documents, and with which Contractor shall comply. RFI-Replies do not constitute changes in Contract Sum or Contract Time except as otherwise agreed in writing by Owner. RFI-Replies will be issued through the RFI administrative system.

63. Samples: Physical examples of materials, equipment, or workmanship that are representative of some portion of the Work and which establish the standards by which such portion of the Work will be judged.

64. Shop Drawings: All drawings, diagrams, illustrations, schedules, and other data or information which are specifically prepared or assembled by or for Contractor and submitted by Contractor to illustrate some portion of the Work.

65. Shown: As indicated on Drawings.

66. Site: The particular geographical location of Work performed pursuant to the Contract Documents.

67. Specifications: The written portion of the Contract Documents consisting of requirements for materials, equipment, construction systems, standards, and workmanship for the Work; performance of related services.

68. Specified: As written in Specifications.

69. Subcontractor: A person or entity that has a direct contract with Contractor to perform a portion of the Work at the Site. The term Subcontractor is referred to throughout the Contract Documents as if singular in number and neutral in gender and means a Subcontractor or an authorized representative of the Subcontractor. The term Subcontractor does not include a separate contractor or subcontractors of a separate contractor.

70. Substantial Completion: The Work (or a specified part thereof) has progressed to the point where, in the opinion of Owner as evidenced by a notice or certificate of Substantial Completion, the Work is sufficiently complete, in accordance with Contract Documents, so that the Work (or specified part) can be utilized for the purposes for which it is intended, and unperformed or incomplete work elements are minor in nature; or if no such certificate is issued, when the Work (or specified part) is complete and ready for final payment as evidenced by written recommendation of Owner for final payment. The terms **"Substantially Complete"** and **"Substantially Completed"** as applied to all or part of the Work refer to Substantial Completion thereof.

71. Supplemental Instruction: A written directive from Owner to Contractor ordering alterations or Modifications that do not result in change in Contract Sum or Contract Time, and do not substantially change Drawings or Specifications.

72. Technical Specifications: Specification Sections included within Division 02 and above.

73. Testing and Special Inspection Agency: An independent entity engaged to inspect and/or test the workmanship, materials, or manner of construction of buildings or portions of buildings, to determine if such construction complies with the Contract Documents and applicable codes.

74. TIE: Time Impact Evaluation; see Section 01 2600 (Modification Procedures). May also be referred to as Time Impact Analysis (**TIA**).

75. Underground Facilities: All pipelines, conduits, ducts, cables, wires, manholes, vaults, tanks, tunnels or other such facilities or attachments, and any encasements containing such facilities that have been installed underground to furnish any of the following services or materials: electricity, gases, chemicals, steam, liquid petroleum products, telephone or other communications, cable television, sewage and drainage removal, traffic or other control systems, or water.

76. Unit Price Work: Shall be the portions of the Work for which a unit price is provided in Document 00 5200 (Agreement) or Section 01 1100 (Summary).

77. Work: The entire completed construction, or the various separately identifiable parts thereof, required to be furnished under the Contract Documents within the Contract Time. Work includes and is the result of performing or furnishing labor and furnishing and incorporating materials and equipment into the construction, and performing or furnishing services and furnishing documents, all as required by the Contract Documents including everything shown in the Drawings and set forth in the Specifications. Wherever the word "work" is used, rather than the word "Work," it shall be understood to have its ordinary and customary meaning.

B. **Other Defined Terms**

The following terms are not necessarily identified with initial caps; however they shall have the meaning set forth below:

1. Wherever words "as directed," "as required," "as permitted," or words of like effect are used, it shall be understood that direction, requirements, or permission of Owner is intended. Words "sufficient," "necessary," "proper," and the like shall mean sufficient, necessary, or proper in judgment of Owner. Words "approved," "acceptable," "satisfactory," "favorably reviewed," or words of like import, shall mean approved by, or acceptable to, or satisfactory to, or favorably reviewed by Owner.

2. Wherever the word "may" or "ought" is used, the action to which it refers is discretionary. Wherever the word "shall" or "will" is used, the action to which it refers is mandatory.

PART 2 - PRODUCTS – NOT USED

PART 3 - EXECUTION – NOT USED

END OF SECTION

DIVISION 1 GENERAL REQUIREMENTS

SECTION 01 7700

CONTRACT CLOSEOUT

PART 1 GENERAL

1.01 Summary.

A. Section describes requirements and procedures for:

1. Project cleaning
2. Testing of equipment and systems
3. Substantial Completion
4. Final Completion
5. Close Out
6. Warranties

1.02 Substantial Completion.

A. Removal of Temporary Construction Facilities and Project Cleaning.

1. Prior to Substantial Completion inspection: remove temporary materials, equipment, services, and construction; clean all areas affected by the Work; clean and repair damage caused by installation or use of temporary facilities; restore permanent facilities used during construction to specified condition.

B. Equipment and Systems.

1. Prior to Substantial Completion, Contractor shall start up, run for periods prescribed by Owner, operate, adjust and balance all manufactured equipment and Project systems including, without limitation, mechanical, electrical, safety, fire, and controls.
2. Demonstrate that such equipment and systems conform to contract standards and manufacturer's guarantees. Where applicable, use testing protocols specified, and if the contract is silent, then consistent with manufacturer's recommendations and industry standards.

C. Procedure for Substantial Completion.

1. When Contractor considers Work or designated portion of the Work as Substantially Complete, submit written notice to Owner, with list of items remaining to be completed or corrected and explanation of why such items do not prevent Owner's beneficial use and occupancy of the Work for its intended purposes. Within reasonable time, Owner will inspect to determine status of completion.
2. Should Owner determine that Work is not Substantially Complete, Owner will promptly notify Contractor in writing, listing all defects and omissions. Contractor shall remedy deficiencies and send a second written notice of Substantial Completion. Owner will reinspect the Work. If deficiencies previously noted are not corrected on reinspection, then pay the cost of the reinspection.
3. When Owner concurs that Work is Substantially Complete, Owner will issue a written notice or certificate of Substantial Completion, accompanied by Contractor's list of items to be completed or corrected as verified by Owner.
4. Manufactured units, equipment and systems that require startup must have been started up and before a notice or certificate of Substantial Completion will be issued.
5. A punch list examination will be performed upon Substantial Completion. One follow-up review of punch list items for each discipline will be provided. If further Site visits are required to review punch list items due to incompleteness of the Work by Contractor, Contractor will reimburse Owner for costs associated with these visits.

1.03 Final Completion.

A. Requirements.

1. Final Completion occurs when Work meets requirements for Owner's Final Acceptance.

B. Procedure.

1. When Contractor considers Work is Finally Complete, submit written certification that:
   (a) Contractor has inspected Work for compliance with Contract Documents, and all requirements for Final Acceptance have been met.
   (b) Except for Contractor maintenance after Final Acceptance, Work has been completed in accordance with Contract Documents and deficiencies listed with Certificate of Substantial Completion have been corrected. Equipment and systems have been tested in the presence of Owner, and are operative.
   (c) Project Record Documents are completed and turned over to Owner, and Work is complete and ready for final inspection.
2. In addition to submittals required by Contract Documents, provide submittals required by governing authorities and submit final statement of accounting giving total adjusted Contract Sum, previous payments, and sum remaining due.
3. Should Owner determine that Work is incomplete or Defective, Owner promptly will so notify Contractor, in writing, listing the incomplete or Defective items. Contractor shall promptly remedy the deficiencies and notify the Owner when it is ready for reinspection.

C. Final Adjustments of Accounts.

1. Submit a final statement of accounting to Owner, showing all adjustments to the Contract Sum and complete and execute Document 00 6530 (Agreement and Release of Claims).
2. If so required, Owner shall prepare a final Change Order for submittal to Contractor, showing adjustments to the Contract Sum that were not previously made into a Contract Modification.

D. Warranties.

1. Execute Contractor's Submittals and assemble warranty documents, and Installation, Operation, and Maintenance Manuals, executed or supplied by Subcontractors, suppliers, and manufacturers. Provide table of contents and assemble in 8½ inches by 11 inches three-ring binder with durable plastic cover, appropriately separated and organized. Assemble in Specification Section order.
2. Submit material prior to final Application for Payment. For equipment put into use with Owner's permission during construction, submit within 14 Days after first operation. For items of Work delayed materially beyond Date of Substantial Completion, provide updated Submittal within 14 Days after acceptance, listing date of acceptance as start of warranty period.
3. Warranty Forms: Submit drafts to Owner for approval prior to execution. Forms shall not detract from or confuse requirements or interpretations of Contract Documents. Warranty shall be countersigned by manufacturers. Where specified, warranty shall be countersigned by Subcontractors and installers.
4. Rejection of Warranties: Owner reserves right to reject unsolicited and coincidental product warranties that detract from or confuse requirements or interpretations of Contract Documents.
5. Term of Warranties: For materials, equipment, systems, and workmanship, warranty period shall be one year minimum from date of Final Completion of entire Work except where:
   (a) Detailed Specifications for certain materials, equipment or systems require longer warranty periods.
   (b) Materials, equipment or systems are put into beneficial use of Owner prior to Final Completion as agreed to in writing by Owner.

E. Warranty of Title.

1. No material, supplies, or equipment for Work under Contract shall be purchased subject to any chattel mortgage, security agreement, or under a conditional sale or other agreement by which an interest therein or any part thereof is retained by seller or supplier. Contractor warrants good title to all material, supplies, and equipment installed or incorporated in Work and agrees upon completion of all Work to deliver premises, together with improvements and appurtenances constructed or placed thereon by Contractor, to Owner free from any claim, liens, security interest, or charges, and further agrees that neither Contractor nor any person, firm, or corporation furnishing any materials or labor for any Work covered by Contract shall have right to lien upon premises or improvement or appurtenances thereon. Nothing contained in this paragraph, however, shall defeat or impair right of persons furnishing materials or labor under bond given by Contractor for their protection or any rights under law permitting persons to look to funds due Contractor in hands of Owner.

F. Turn-In. Contract Documents will not be closed out and final payment will not be made until all keys issued to Contractor during prosecution of Work and letters from property owners, pursuant to Contract Documents, are turned in to Owner.

G. Release of Claims. Contract Documents will not be closed out and final payment will not be due or made until Document 00 6530 (Agreement and Release of Claims) is completed and executed by Contractor and Owner.

H. Fire Inspection Coordination. Coordinate fire inspection and secure sufficient notice to Owner to permit convenient scheduling (if applicable).

I. Building Inspection Coordination. Coordinate with Owner a final inspection for the purpose of obtaining an occupancy certificate (if applicable).

PART 2– PRODUCTS NOT USED

PART 3– EXECUTION NOT USED

END OF SECTION

Project Manual

For

Coastside Fire Protection District

Fire Station No. 44

501 Stetson Street, Moss Beach, CA 94038

Bidding and Contract Requirements
And
Specifications

for the

Coastside Fire Protection District
555 Obispo Road, Half Moon Bay, CA 94018

Date: March 2026

PBK Project No.: 230137

Construction Documents

Project Manual

for:

Coastside Fire Protection District

Fire Station No. 44

for the

Coastside Fire Protection District

Date: March 2026

PBK Project No.: 230137

Construction Documents

Consultants:

Architect:
PBK Architects
408 Higuera Street, Ste 100
San Luis Obispo, CA 93401
Phone: (805) 329-3076

Site Structural:
Miyamoto Structural Engineers.
1047 West Sixth St, Ste A
Ontario, CA 91762
Phone: (833) 270-8848

Building Structural:
MLA Structural Engineers, Inc.
1132 Suncast Lane, Ste 6
El Dorado Hills, CA 95762
Phone: (916) 941-2435

Civil:
MCR Engineering
1242 Dupont Ct.
Manteca, CA 95336
Phone: (209) 239-6229

Mechanical/ Plumbing:
Pocock Design Solutions
14451 Chambers Road, Ste 210
Tustin, CA 92780
Phone: (949) 417-3903

Landscape:
WDSLA
2020 I Street, Suite 220,
Sacramento, CA 95811
Phone: (916) 524-5614

Electrical:
A&F Engineering Group Inc.
9320 Baseline Rd, Ste C
Rancho Cucamonga, CA 91701
Phone: (909) 941-3008

Project Manual Cover Sheet and Seal Page.

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SECTION 01 25 13 PRODUCT SUBSTITUTION PROCEDURES

PART 1 GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section Includes:
1. Specified product compliance, and product quality assurance.
2. Specific administrative and procedural requirements for handling requests for substitutions made prior to award of Contract.
3. Requirements for product delivery, storage, and handling.

B. Related Requirements:
1. Instructions to Offerors:
   a. Product options and procedures for submittal of requests for substitutions during the Proposal period.

1.3 DEFINITIONS

A. Definitions used in this Section are not intended to negate the meaning of other terms used in the Contract Documents, including such terms as “specialties,” “systems,” “structure,” “finishes,” “accessories,” “furnishings,” “special construction,” and similar terms. Such terms are self-explanatory and have recognized meanings in the construction industry:
1. Equipment: Product with operational parts, regardless of whether motorized or manually operated, and in particular, a product that requires service connections such as wiring or piping.
2. Materials: Products that must be substantially cut, shaped, worked, mixed, finished, refined, or otherwise fabricated, processed, or installed to form units of work.
3. Products:
   a. Items purchased for incorporation in the Work, regardless of whether they were specifically purchased for the Project or taken from Contractor’s previously purchased stock. The term “product” as used herein includes the terms “material”, “equipment”, “system”, and other terms of similar intent:
      1) Named products: Identified by the use of the manufacturer’s name for a product, including such items as a make or model designation as recorded in published product literature of the latest issue as of the date of the Contract Documents.
      2) Specified products: Same as Named Products.

1.4 QUALITY ASSURANCE

A. Source Limitations:
1. To the fullest extent possible, provide products of the same generic kind from a single source for each unit of work:
   a. When it is discovered that specific products are available only from sources that do not or cannot produce an adequate quantity to complete Project requirements in a timely manner, consult with the Architect/Engineer for a determination of what product quantities are most important before proceeding. The Architect/Engineer will designate those qualities, such as visual, structural, durability, or compatibility

that are most important. When the Architect/Engineer's determination has been made, select products from those sources that produce products that possess the most important qualities to the fullest extent possible.

B. Compatibility of Options:
   1. Compatibility of products is a basic requirement of product selection. When Contractor is given the option of selecting between two (2) or more products for use on the Project, the product selected must be compatible with other products previously selected, even if the products previously selected were also Contractor options. The complete compatibility between the various choices available to Contractor is not assured by the various requirements of the Contract Documents but must be provided by Contractor.

C. Or Equal:
   1. Where the phrase "or equal," "or equivalent," "or Architects approved equal," or similar phrasing occurs in the Proposal Documents, do not assume that materials, equipment, or methods of construction will be approved by the Architect unless the item has been specifically approved for this Work by the Architect.
   2. The decision of the Architect shall be final.

D. Where a proposed substitution involves the work of more than one (1) contractor, each contractor involved shall cooperate and coordinate the work with all other contractors involved, so as to provide uniformity and consistency and to assure the compatibility of products.

E. Foreign Product Limitations:
   1. "Foreign products" as distinguished from "domestic products" are defined as products that are either manufactured substantially (50 percent or more of value) outside of the United States and its possessions, or produced or supplied by entities known to be substantially owned (more than 50 percent) by persons who are not citizens of, nor living within the United States and its possessions.
   2. Except under one (1) of the following conditions, select and provide domestic, not foreign, products for inclusion in the Work:
      a. There is no domestic product available that complies with the requirements of the Contract Documents.
      b. Available domestic products that comply with the requirements of the Contract Documents are available only at prices or other procurement terms that are substantially higher (25 percent or more) than for available foreign products that comply with the requirements of the Contract Documents.
      c. At the discretion of Architect or Owner.
   3. Final determination and acceptance will be the responsibility of Architect.

1.5 SUBSTITUTIONS OF PRODUCTS

A. The products described in the Proposal Documents establish a standard of required function, dimension, appearance, and quality to be met by any proposed substitution. The materials and equipment named in, and the procedures covered by these Specifications have been selected as a standard because of quality, particular suitability, or record of satisfactory performance. It is not intended to preclude the use of equal or better materials or equipment, provided that same meets the requirements of the particular Project and is approved in an Addendum as a substitution prior to the submission of proposals.

B. No substitution will be considered prior to receipt of proposals unless written request for approval has been received by the Architect at least seven (7) days prior to the date for receipt of proposals. Each such request shall include the name of the material or equipment for which it is to be substituted and a complete description of the proposed substitute

including Drawings, cuts, performance and test data, and any other information necessary for an evaluation. The Architect's decision of approval or disapproval of a proposed substitution shall be final.

C. If the Architect approves any proposed substitution prior to receipt of proposals, such approval will be set forth in an Addendum. Offerors shall not rely upon approvals made in any other manner.

D. The Architect and Owner reserve the right to disapprove the use of any manufacturer who in their judgment is unsuitable for use on the Project and that decision will be final.

E. The following are not considered as substitutions:
1. Revisions to the Contract Documents, when requested by Owner, Architect, or any of their consultants are considered as changes, not substitutions.
2. Specified Contractor options on products and construction methods included in Contract Documents are choices made available to Contractor and are not subject to the requirements specified in this Section for substitutions.
3. Except as otherwise provided in the Contract Documents, Contractor's determination of and compliance with governing authorities does not constitute substitutions, nor does it constitute a basis for change orders.

F. The following may be considered as a reason for a request for substitution:
1. The request is directly related to an "or approved equal" clause or similar language in the Contract Documents.
2. The specified product or method of construction cannot be provided within the Contract Time in accordance with the paragraph below concerning availability of specified items.
3. The specified product or method of construction cannot receive necessary approval by a governing authority, but the requested substitution can be approved.
4. A substantial advantage is offered to Owner, in terms of cost, time, energy conservation, or other consideration of merit, after deducting offsetting responsibilities Owner may be required to bear. These additional responsibilities may include such considerations as additional compensation to Architect/Engineer for redesign and evaluation services, the increased cost of other work by Owner or separate contractors, and similar considerations.
5. The specified product or method of construction cannot be provided in a manner that is compatible with other materials, but Contractor certifies that the substitution will overcome the incompatibility.
6. The specified product or method of construction cannot be coordinated with other materials, but Contractor certifies that the proposed substitution can be coordinated with them.
7. The specified product or method of construction cannot provide a warranty required by the Contract Documents, but Contractor certifies that the proposed substitution provides the required warranty.

G. Availability of Specified Items:
1. Verify prior to submittal of Proposal that all specified items will be available in time for installation during orderly and timely progress of the Work:
   a. In the event specified items will not be so available, notify the Architect prior to receipt of Proposals. Submit Request for Substitutions in accordance with this Section.
   b. The request will not be considered if the product or method cannot be provided as a result of Contractor's failure to pursue the Work promptly or coordinate activities properly.
2. Costs of delays because of non-availability of specified items, when such delays could have been avoided by Contractor, will be back-charged as necessary and shall not be borne by Owner.

H. A request constitutes a representation that Offeror:
   1. Has investigated proposed product and determined that it meets or exceeds quality level of specified product.
   2. Will provide same warranty for substitution as for specified product, except when inability to provide specified warranty is reason for request for substitution as described above.
   3. Will coordinate installation and make changes to other work that may be required for the Work to be complete with no additional cost to Owner.
   4. Waives claims for additional costs or time extension that may subsequently become apparent.
   5. Will reimburse Owner and pay for all costs, including Architect/Engineer's redesign and evaluation costs resulting from the use of the proposed substitution, or for review or redesign of services associated with re-approval by authorities having jurisdiction.

I. No substitutions will be considered after the Award of Contract.

1.6 SUBSTITUTION REQUEST SUBMITTAL

A. Requests for Substitutions:
   1. Submit three (3) copies of each request for substitution. In each request, identify the product or fabrication or installation method to be replaced by the substitution. Include related Specifications Section and Drawing numbers, and complete documentation showing compliance with the requirements for substitutions. Include, as appropriate, with each request, the following information:
      a. Product data, drawings, and descriptions of products, fabrication, and installation procedures.
      b. Samples, where applicable or requested.
      c. A detailed comparison of the significant qualities of the proposed substitution with those of the Work originally specified. Significant qualities may include elements such as size, weight, durability, performance, and visual effect, where applicable.
      d. Coordination information, including a list of changes or modifications needed by other parts of the Work and to construction performed by Owner and separate contractors that will become necessary to accommodate the proposed substitution.
      e. A statement indicating the effect the substitution will have on the Contractor's Construction Schedule compared to the schedule without approval of the substitution. Indicate the effect of the proposed substitution on overall Contract Time.
      f. Cost information, including a proposal of the net change, if any, in the Contract Sum.
      g. Certification by Contractor to the effect that, in Contractor's opinion, after thorough evaluation, the proposed substitution will result in work that in every significant respect is equal to, or better than, the Work required by the Contract Documents, and that it will perform adequately in the application indicated. Include Contractor's waiver of rights to additional payment or time that may subsequently become necessary because of the failure of the substitution to perform adequately.
      h. A statement indicating that Contractor will reimburse Owner and pay for all costs, including Architect/Engineer's re-design and evaluation costs resulting from the use of the proposed substitution.

B. Work-Related Submittals: Contractor's submittal of, and Architect/Engineer's acceptance of, shop drawings, product data, or samples related to work not complying with the Contract Documents, does not constitute an acceptance or valid request for a substitution, nor approval thereof.

1.7 DELIVERY, STORAGE, AND HANDLING

A. General:
1. Deliver, store, and handle products in accordance with manufacturer's recommendations, using means and methods that will prevent damage, deterioration, and loss, including theft. Control to prevent overcrowding of construction spaces or overloading of structure. In particular, coordinate delivery and installation to ensure minimum holding or storage times for items known or recognized to be flammable, hazardous, easily damaged, or sensitive to deterioration, theft, and other sources of loss:
   a. Deliver products to the site in the manufacturer's sealed containers or other packaging system, complete with labels intact, and instructions for handling, storage, unpacking, installing, cleaning, and protecting.
   b. Cover products subject to deterioration with impervious sheet covering. Provide ventilation to avoid condensation or potential degradation of product.
   c. Store loose granular materials on solid flat surfaces in a well-drained area. Prevent mixing with foreign matter.
   d. Store products at the site or in a bonded and insured off-site storage facility or warehouse in a manner that will facilitate inspection and measurement of quantity or counting of units. Periodically inspect to verify products are undamaged and are maintained in acceptable condition.
   e. Store heavy materials away from the Project structure or in a manner that will not endanger the supporting construction.

PART 2 PRODUCTS

2.1 GENERAL PRODUCT COMPLIANCE

A. General:
1. Requirements for individual products are indicated in the Contract Documents; compliance with these requirements is in itself a Contract requirement. These requirements may be specified in any one (1) of several different specifying methods, or in any combination of these methods. These methods include the following:
   a. Proprietary.
   b. Descriptive.
   c. Performance.
   d. Compliance with Reference Standards.
2. Compliance with codes, compliance with graphic details, allowances, and similar provisions of the Contract Documents also have a bearing on the selection process.

B. Procedures for Selecting Products:
1. Contractor's options in selecting products are limited by requirements of the Contract Documents and governing regulations. They are not controlled by industry traditions or procedures experienced by Contractor on previous construction projects. Required procedures include, but are not limited to, the following for the various indicated methods of specifying:
   a. Proprietary and semi-proprietary Specification requirements:
      1) Single product name: Where only a single product or manufacturer is named, provide the product indicated, unless the Specification indicates the possible consideration of other products. Advise Architect/Engineer before proceeding, when it is discovered that the named product is not a reasonable or feasible solution.
      2) Two (2) or more product names: Where two (2) or more products or manufacturers are named, provide one (1) of the products named, at Contractor's option. Exclude products that do not comply with Specification requirements. Do not provide or offer to provide an unnamed product, unless the Specification indicates the possible consideration of other products.

Advise Architect/Engineer before proceeding where none of the named products comply with Specification requirements or are not feasible for use. Where products or manufacturers are specified by name, accompanied by the term “or approved equal” or similar language, comply with this Section regarding substitutions to obtain approval from Architect/Engineer for the use of an unnamed product.

b. Nonproprietary Specification requirements: Where the Specifications name products or manufacturers that are available and may be incorporated in the Work, but do not restrict Contractor to the use of these products only, Contractor may, at his option, use any available product that complies with the Contract requirements.
c. Descriptive Specification requirements: Where the Specifications describe a product or assembly generically, in detail, listing the exact characteristics required, but without use of a brand name, provide products or assemblies that provide the characteristics indicated and otherwise comply with Contract requirements.
d. Performance Specification requirements: Where the Specifications require compliance with indicated performance requirements, provide products that comply with the specific performance requirements indicated, and that are recommended by the manufacturer for the application indicated. The manufacturer’s recommendations may be contained in published product literature, or by the manufacturer’s individual certification of performance. General overall performance of a product is implied where the product is specified for specific performances.
e. Compliance with standards, codes, and regulations: Where the Specifications require only compliance with an imposed standard, code, or regulation, Contractor has the option of selecting a product that complies with Specification requirements, including standards, codes, and regulations.
f. Visual matching: Where matching an established sample is required, the final judgement of whether a product proposed by Contractor matches the sample satisfactorily will be determined by Architect. Where there is no product available within the specified product category that matches the sample satisfactorily and also complies with other specified requirements, comply with the provisions of this Section regarding substitutions and other Contract Documents for change orders for the selection of a matching product in another product category, or for noncompliance with specified requirements.
g. Visual selection: Except as otherwise indicated, where specified product requirements include the phrase “…as selected from the manufacturer’s standard colors, patterns, textures…” or similar phrases, Contractor has the option of selecting the product and manufacturer, provided the selection complies with other specified requirements. Architect is subsequently responsible for selecting the color, pattern, and texture from the product line selected by Contractor.
h. Allowances: Refer to individual Sections of the Specifications for an indication of product selections that are controlled by established allowances, and for the procedures required for processing such selections.

C. Producer’s Statement of Applicability: Where individual Specification Sections indicate products that require a “Statement of Applicability” from the manufacturer or other producer, submit a written certified statement from the producer stating that the producer has reviewed the proposed application of the product on the Project. This statement shall affirm that the producer agrees with, or does not object to, Architect/Engineer’s Specification, and that Contractor’s selection of the product on the Project is suitable and proper.

2.2 SUBSTITUTIONS

A. Condition: Contractor’s request for substitution will be received and considered when extensive revisions to Contract Documents are not required, when the proposed changes are in keeping with the general intent of the Contract Documents, when the request is timely, fully documented and properly submitted, and when one (1) or more of the above

conditions are satisfied, all as judged and determined by Architect/Engineer; otherwise, the requests will be returned without action except to record noncompliance with these requirements.

PART 3 EXECUTION

3.1 INSTALLATION OF PRODUCTS

A. General: Except as otherwise indicated in individual Sections of these Specifications, comply with the manufacturer's instructions and recommendations for installation of the products in the applications indicated.

B. Anchor each product securely in place, accurately located, and aligned with other work.

C. Clean exposed surfaces and protect surfaces as necessary to ensure freedom from damage and deterioration at time of acceptance.

D. Products and assemblies shall be installed complete, in-place, watertight, and structurally sound.

3.2 INSTALLATION OF APPROVED SUBSTITUTIONS

A. Coordinate all approved substitutions with adjacent work.

B. Comply with the manufacturer's and/or supplier's instructions and recommendations for installation of the products in the applications indicated.

C. Provide all items required by manufacturer and/or supplier regarding installation, i.e. supplemental supports, anchors, fasteners, painting, etc., whether or not indicated or specified.

END OF SECTION 01 25 13

SECTION 01 26 13 REQUEST FOR INFORMATION

PART 1 GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section includes administrative and procedural provisions for preparation, submittal and response to Contractor's Request for Information (RFI's) during construction of project.

B. Related Sections:
1. General Conditions of the Contract.

1.3 DEFINITIONS

A. PDF, Portable Document Format: An open standard file format licensed by Adobe Systems used for representing documents in a device-independent and display resolution-independent fixed-layout document format.

B. RFI, Request for Information: Request from Contractor seeking information required by or clarification of the Contract Documents.

1.4 SUBMITTAL PROCEDURES

A. General Submittal Procedure Requirements: Submit RFI's via email as PDF electronic files. Architect will not act on any RFI's until 7 days following the submission of the Schedule of Values per Division 01 Section "Payment Procedures."
1. RFI Form: Use RFI form included at end of this Section or form acceptable to Architect. Upon request from the Contractor, the form at the end of this section will be made available in WORD format from the Architect.
2. Attachments: Attachments shall be in PDF electronic file format.

1.5 REQUESTS FOR INFORMATION (RFIS)

A. General: Immediately on discovery of the need for additional information or interpretation of the Contract Documents, Contractor shall prepare and submit an RFI in the form specified.
1. Architect will return RFIs submitted to Architect by other entities controlled by Contractor with no response.
2. Coordinate and submit RFIs in a prompt manner so as to avoid delays in Contractor's work or work of subcontractors.

B. Content of the RFI: Include a detailed, legible description of item needing information or interpretation and the following:
1. Project name.
2. Project number.
3. Date.
4. Name of Contractor.
5. Name of Architect
6. RFI number, numbered sequentially.
7. RFI subject.

8. Specification Section number and title and related paragraphs, as appropriate.
9. Drawing number and detail references, as appropriate.
10. Field dimensions and conditions, as appropriate.
11. Contractor's suggested resolution. If Contractor's solution(s) impacts the Contract Time or the Contract Sum, Contractor shall state impact in the RFI.
12. Contractor's signature.
13. Attachments: Include sketches, descriptions, measurements, photos, Product Data, Shop Drawings, coordination drawings, and other information necessary to fully describe items needing interpretation.
    a. Include dimensions, thicknesses, structural grid references, and details of affected materials, assemblies, and attachments on attached sketches.

C. Architect's Action: Architect will review each RFI, determine action required, and respond. Allow 10 working days for Architect's response for each RFI. RFIs received by Architect after 1:00 p.m. will be considered as received the following working day.
1. The following RFIs will be returned without action:
    a. Requests for approval of submittals.
    b. Requests for approval of substitutions.
    c. Requests for approval of Contractor’s means and methods.
    d. Requests for coordination information already indicated in the Contract Documents.
    e. Requests for adjustments in the Contract Time or the Contract Sum.
    f. Requests for interpretation of Architect's actions on submittals.
    g. Incomplete RFIs or inaccurately prepared RFIs.
2. Architect's action may include a request for additional information, in which case Architect's time for response will date from time of receipt of additional information.
3. Architect's action on RFIs that may result in a change to the Contract Time or the Contract Sum may be eligible for Contractor to submit Change Proposal according to Division 01 Section "Contract Modification Procedures."
    a. If Contractor believes the RFI response warrants change in the Contract Time or the Contract Sum, notify Architect in writing within 10 days of receipt of the RFI response.
4. Distribution: One electronic copy of each completed RFI review shall be distributed by the Architect to the Contractor and the Owner.

D. RFI Log: Prepare, maintain, and submit a tabular log of RFIs organized by the sequential RFI number. Submit log weekly unless otherwise directed in writing by Architect. Include the following:
1. Project name.
2. Name and address of Contractor.
3. Name and address of Architect.
4. RFI number including RFIs that were returned without action or withdrawn.
5. RFI description.
6. Date the RFI was submitted.
7. Date Architect's response was received.

E. On receipt of Architect's action, update the RFI log and immediately distribute the RFI response to affected parties. Review response and notify Architect within 7 days if Contractor disagrees with response.

F. Contractor’s Expense for RFI’s: Architect will review and respond to legitimate RFI’s at no additional cost to the Contractor. RFI’s determined by the Architect to be flagrant or unnecessary will have the expense for the Architect’s time paid by the Owner with the amount being deducted from the Contract Sum. The expense will be based on an hourly rate in accordance with the Architect’s standard hourly rate schedule in effect at the time the work is performed with a minimum of one hour for each flagrant or unnecessary RFI.

PART 2 PRODUCTS (NOT USED)

PART 3 EXECUTION (NOT USED)

END OF SECTION 01 26 13

CONTRACTOR'S REQUEST FOR INFORMATION

RFI #

From: _____ Project Number:_____ Date: __

To: Project: _____

Disciplines Impacted: Architectural [ ] Structural [ ] Mechanical [ ] Electrical [ ]
Civil [ ] Landscape [ ] Kitchen [ ]

Reference: _____ Drawing(s) _____ Spec. Section(s) _____

Other

Please clarify or provide the following information:

_____

Contractor's Suggestions:_____

_____

Possible Cost Impact: Unknown [ ] Increase [ ] Decrease [ ] No Change [ ]

Possible Time Impact: Unknown [ ] Increase [ ] Decrease [ ] No Change [ ]

This information is required as soon as possible, but no later than _____

[ ] PRIORITY ATTENTION REQUIRED

Contractor's Representative:

_____

Architect's Response: Date: _____

PBK Architects Copies____

_____

SECTION 01 29 00 PAYMENT PROCEDURES

PART 1 GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section includes administrative and procedural requirements necessary to prepare and process Applications for Payment.

1.3 DEFINITIONS

A. Pencil Copy: A copy submitted prior to a final/official.

B. Schedule of Values: A statement furnished by Contractor allocating portions of the Contract Sum to various portions of the Work and used as the basis for reviewing Contractor's Applications for Payment.

1.4 SCHEDULE OF VALUES

A. Coordination:
   1. Coordinate preparation of the schedule of values with preparation of Contractor's Construction Schedule:
      a. Coordinate line items in the schedule of values with administrative forms and schedules, including the following:
         1) Application for Payment forms with continuation sheets.
         2) Updated submittal schedule.
         3) Items required to be indicated as separate activities in updated Contractor's Construction Schedule.
      b. Submit the schedule of values to Architect at earliest possible date, but no later than seven (7) days before the date scheduled for submittal of initial Applications for Payment. Contractor's standard form or electronic media printout will be considered but must be approved by Owner.

B. Format and Content:
   1. Use Project manual table of contents as a guide to establish line items for the schedule of values. Provide at least one (1) line item for each Specification Section:
      a. Identification:
         1) Include the following Project identification on the schedule of values:
            a) Project name and location.
            b) Name of Architect.
            c) Architect's Project number.
            d) Contractor's name and address.
            e) Date of submittal.
   2. Arrange schedule of values consistent with format of AIA Documents G702/G703.
   3. Arrange the schedule of values in tabular form with separate columns to indicate the following for each item listed:
      a. Related Specification Section or Division.
      b. Description of the Work.
      c. Name of Subcontractor.

d. Name of manufacturer or fabricator.
e. Name of supplier.
f. Change Orders (numbers) that affect value.
g. Dollar value of the following, as a percentage of the Contract Sum to nearest one-hundredth percent (.01%), adjusted to total 100 percent:
    1) Labor.
    2) Materials.
    3) Equipment rentals.
    4) General Conditions:
        a) Supervisor.
        b) Submittals.
        c) Closeout.
        d) Field Engineering.
        e) Daily Clean-up.
        f) Final Clean-up.

4. Round amounts to nearest whole dollar; total shall equal the Contract Sum.
5. Provide separate line item in the schedule of values for each part of the Work where Applications for Payment may include materials or equipment purchased or fabricated and stored, but not yet installed:
    a. Differentiate between items stored on site and items stored off site. Include evidence of insurance.
6. Allowances: Provide a separate line item in the schedule of values for each allowance. Show line item value of unit cost allowances, as a product of the unit cost, multiplied by measured quantity. Use information indicated in the Contract Documents to determine quantities.
7. Each item in the schedule of values and Applications for Payment shall be complete. Include total cost and proportionate share of general overhead and profit for each item:
    a. Temporary facilities and other major cost items that are not direct cost of actual Work in place may be shown either as separate line items in the schedule of values or distributed as general overhead expense.
8. Schedule updating: Update and resubmit the schedule of values before the next Applications for Payment when Change Orders or Construction Change Directives result in a change in the Contract Sum.

1.5 APPLICATION FOR PAYMENT

A. Submit preliminary (pencil) copy of proposed values to PBK Construction Field Representative and Owner for review by the 20th of the month. Allow four (4) days for comments. Schedule review of the pencil copy during bi-monthly site visits.

B. Once preliminary (pencil) approved, submit four (4) notarized originals of each application on AIA Form G702 - Application and Certificate for Payment and AIA G703 - Continuation Sheet for G702 or other similar form approved by Owner.

C. Content and Format: Utilize schedule of values for listing items in Application for Payment.

D. Submit updated construction or recovery schedule with each Application for Payment.

E. Payment Period: Submit at intervals stipulated in Owner/Contractor Agreement. Include Supplementary Conditions of the Contract.

F. Only materials stored on the Project site shall be paid for unless the materials are stored in a bonded warehouse agreed upon by Owner. Periodic review of stored item will be required by the inspector of record.

G. Substantiating Data:

1. When Architect/Engineer requires substantiating information, submit data justifying dollar amounts in question. Items that may be requested by Architect or Owner to substantiate costs include, but are not limited to the following:
   a. Current Record Documents as specified in Section 01 77 00: Closeout Procedures.
   b. Labor time sheets, purchase orders, or similar documentation.
   c. Affidavits attesting to products stored off-site.

PART 2 PRODUCTS (NOT USED)

PART 3 EXECUTION (NOT USED)

END OF SECTION 01 29 00

SECTION 01 29 73 SCHEDULE OF VALUES - SAMPLE

PART 1 GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section Includes: Schedule of values listing to be edited by Contractor of description of Work, not scheduled value, Work completed, stored materials, total complete, percentage, balance to finish, and retainage. These parts must remain intact.

B. Related Sections:
   1. Section 01 29 00: Payment Procedures.

1.3 DEFINITIONS

A. Pencil Copy: A copy submitted prior to a final/official submission on a monthly basis.

B. Schedule of Values: A statement furnished by Contractor allocating portions of the Contract Sum to various portions of the Work and used as the basis for reviewing Contractor's Applications for Payment.

1.4 SCHEDULE OF VALUES

MATRIX TO START ON NEXT PAGE:

This is a sample illustration:

Item No.	Description of Work	Scheduled Value	Work Completed		Stored Materials	Total Completed	%	Balance To Finish	Retainage
			Previous App.	This App.					
	Div. 1 - General Reqs.								
	Site Work General Conditions								
	Supervision								
	Mobilization								
	Bonds & Insurance								
	Permits								
	Contractor's Fee								
	Closeout Documents								
	Div. 1 - Total								
	Div. 2 - Existing Conditions								
	Demolition (As applicable)								
	Erosion Control								
	Div. 2 - Total								
	Div. 3 - Concrete								
	Drill Piers								
	Caps & Beams								
	Slab on Grade								
	Cooling Tower Basin								
	Misc Bldg Conc								
	Floor Sealer								
	Rebar Matl								
	Rebar Labor								
	Lt.Wt.Insul Fill - Materials								
	Lt.Wt.Insul Fill - Labor								
	Submittals/Closeout Documents								
	Supervision Clean-up								
	Div. 3 - Total								
	Div 4 - Masonry								
	Brickwork - Labor								
	Brickwork - Matls								
	Concrete Masonry - Labor								
	Concrete Masonry - Materials								
	Str. Glazed Tile-Labor								
	Str. Glazed Tile-Materials								
	Submittals/Closeout Documents								
	Supervision Clean-up								
	Div. 4 - Total								
	Div 5 - Metals								
	Structural Steel - Labor								
	Structural Steel - Materials								
	Alternating Stairs								
	Misc. Steel - Materials								
	Steel Joists - Materials								
	Lt. Gauge Steel Framing-Labor								
	Lt. Gauge Steel Framing-Matls								
	Metal Decking - Labor								
	Expansion Joint Covers								

Item No.	Description of Work	Scheduled Value	Work Completed		Stored Materials	Total Completed	%	Balance To Finish	Retainage
			Previous App.	This App.					
	Detailing								
	Submittals/Closeout Documents								
	Supervision Clean-up								
	Div. 5 - Total								
	Div. 6 - Wood & Plastics								
	Rough Carpentry - Labor								
	Rough Carpentry - Materials								
	Millwork - Labor								
	Millwork - Materials								
	Submittals/Closeout Documents								
	Div. 6 - Total								
	Div. 7 - Thermal and Moisture Protection								
	Waterpfng / Dampprfng-Matls								
	Waterpfng / Dampprfng-Labor								
	Building Insulation - Labor								
	Building Insulation - Materials								
	Fireproofing - Labor								
	Fireproofing - Materials								
	Metal Roof - Labor								
	Metal Roof - Materials								
	Metal Roof Guarantee								
	Built-up Roofing-Labor								
	Built-up Roofing-Materials								
	Built-up Roofing Guarantee								
	Roof Accessories								
	Building Sheet Metal - Labor								
	Building Sheet Metal - Matls								
	Bldg. Sheet Metal Guarantee								
	Roof Curbs								
	Roof Hatches								
	Sealants								
	Submittals/Closeout Documents								
	Supervision Clean-up								
	Div. 7 - Total								
	Div. 8 - Doors and Frames								
	Finish Carpentry/Door - Labor								
	Finish Hardware - Matls								
	Thresholds & Seals - Matls+B66								
	Hollow Metal Doors & Frames - Matls								
	Plastic Faced Doors-Matls								
	Overhead Doors & Grilles-Labor								
	Overhead Doors & Grilles - Matls								
	Alum. Entrances & Store-fronts - Labor								

Item No.	Description of Work	Scheduled Value	Work Completed		Stored Materials	Total Completed	%	Balance To Finish	Retainage
			Previous App.	This App.					
	fronts - Matls								
	Alum. Windows - Labor								
	Alum Windows - Matls								
	Glass & Glazing-Labor								
	Glass & Glazing-Matls								
	Submittals/Closeout Documents								
	Supervision Clean-up								
	Div. 8 - Total								
	Div. 9 - Finishes								
	Lath & Plaster-Labor								
	Lath & Plaster-Matls								
	Gypsum Wallboard Systems - Labor								
	Gypsum Wallboard Systems - Matls								
	Ceramic Tile - Labor								
	Ceramic Tile - Matls								
	Quarry Tile - Labor								
	Quarry Tile - Matls								
	Terrazzo-Labor								
	Terrazzo-Matls								
	Acoustic Clg. - Labor								
	Acoustic Clg. - Matls								
	Acoustic Wall Panels								
	Resilient Flooring - Labor								
	Resilient Flooring - Matls								
	Carpet - Labor								
	Carpet - Matls								
	Athletic Flooring - Materials								
	Athletic Flooring - Labor								
	Floor Sealer								
	Painting - Labor								
	Painting - Mtls								
	Submittals/Closeout Documents								
	Supervision Clean-up								
	Div. 9 - Total								
	Div. 10 - Specialties								
	Visual Display Boards & Tackboards - Materials								
	Visual Display Boards & Tackboards - Labor								
	Toilet Partitions - Labor								
	Toilet Partitions - Matls								
	Louvers								
	Aluminum Flag Pole								
	Graphics								
	Lockers								
	Cubicle Curtains & Track								
	Fire Extinguisher Cabinets								
	Demountable Partitions-Labor								

Item No.	Description of Work	Scheduled Value	Work Completed		Stored Materials	Total Completed	%	Balance To Finish	Retainage
			Previous App	This App					
	Demountable Partitions-Matls Shelving Toilet Room Accessories-Matls Toilet Room Accessories-Lbr Submittals/Closeout Documents Supervision Clean-up								
	Div. 10 - Total								
	Div. 11 - Equipment Stage Curtains Misc. Appliances Food Service Eqpt-Labor Food Service Eqpt-Matls Submittals/Closeout Documents Supervision Clean-up								
	Div. 11 - Total								
	Div. 12 - Furnishings Horizontal Blinds Projection Screens Casework - Labor Casework - Matls Science Casework - Labor Science Casework - Matls Submittals/Closeout Documents Supervision Clean-up								
	Div. 12 - Total								
	Div. 13 - Specialties Stage Curtains and Draperies Music Instrument Storage Bleachers Press Box Pre-eng. Metal Bldg. Stadium Seating Submittals/Closeout Documents Supervision Clean-up								
	Div. 13 - Total								
	Div. 14 - Conveying Systems Platform Lifts Elevators Submittals/Closeout Documents Supervision Clean-up								
	Div. 14 - Total								
	Div. 21, 22 - Plumbing Shop Drawings As-Builts/Closeout/ O&M Manuals Sanitary Underground – Labor								

Item No.	Description of Work	Scheduled Value	Work Completed Previous App.	Work Completed This App.	Stored Materials	Total Completed	%	Balance To Finish	Retainage
	Sanitary Underground - Matls								
	Storm Underground - Labor								
	Storm Underground - Matls								
	Domestic Water - Labor								
	Domestic Water - Matls								
	Plumbing Insulation - Matls								
	Plumbing Insulation - Labor								
	Gas Piping - Matls								
	Gas Piping - Labor								
	Grease Trap								
	Plumbing Fixtures - Matls								
	Plumbing Fixtures - Labor								
	Coordination Drawings								
	Submittals/Closeout Documents								
	Supervision Clean-up								
	Div. 21, 22 Plumbing - Total								
	Div. 23 - Mechanical								
	Shop Drawings								
	As-Builts/Closeout/ O&M Manuals								
	Chillers - Matls								
	Chillers - Labor								
	Cooling Towers - Matls								
	Cooling Towers - Labor								
	Boilers - Matls								
	Boilers - Labor								
	AHU's - Matls								
	AHU's - Labor								
	Fans - Matls								
	Fans - Labor								
	Grilles - Matls								
	Grilles - Labor								
	Ductwork - Matls								
	Ductwork - Labor								
	Pumps - Mtls								
	Pumps - Labor								
	Water Treatment - Labor								
	Water Treatment - Matls								
	Isolation - Labor								
	Isolation - Matls								
	Pipe Flex - Matls								
	Pipe Flex - Labor								
	Connections								
	Sheet Metal - Matls								
	Sheet Metal - Labor								
	Duct Insulation - Matls								
	Duct Insulation - Labor								

Item No.	Description of Work	Scheduled Value	Work Completed		Stored Materials	Total Completed	%	Balance To Finish	Retainage
			Previous App.	This App.					
	Pipe Insulation - Matls								
	Pipe Insulation - Labor								
	VAV Boxes - Materials								
	VAV Boxes - Labor								
	Refrigerant Monitor - Matls								
	Refrigerant Monitor - Labor								
	Unit Heaters - Materials								
	Unit Heaters - Labor								
	Startup								
	Controls - Matls								
	Control - Labor								
	Engineer / Submittals								
	Modules / End Devices								
	Low Voltage Wiring								
	Startup								
	Closeout Documents								
	Fire Sprinkler								
	Engineer / Submittals								
	Piping - Materials								
	Piping - Labor								
	Equipment - Materials								
	Equipment - Labor								
	Trimout - Materials								
	Trimout - Labor								
	Pipe, Valves, Fittings - Labor								
	Pipe, Valves, Fittings - Matls								
	Misc. - Matls								
	Insulation - Matls								
	Insulation - Labor								
	Sanitary Above Slab-Labor								
	Sanitary Above Slab-Matls								
	Storm Above Slab - Labor								
	Storm Above Slab - Matls								
	Gas - Labor								
	Gas - Matls								
	Fixtures - Labor								
	Fixtures - Matls								
	Permits								
	Coordination Drawings								
	Submittals/Closeout Documents								
	Supervision Clean-up								
	Div. 23 Mechanical - Total								
	Div. 26 - Electrical								
	Mobilization+B220								
	Shop Drawings								
	As-Builts/Closeout/ O&M Manuals								
	Underground								
	Conduit - Labor								
	Conduit - Matl								
	Wire - Labor								

Item No.	Description of Work	Scheduled Value	Work Completed		Stored Materials	Total Completed	%	Balance To Finish	Retainage
			Previous App.	This App.					
	Wire - Matls								
	Feeder Wire - Labor								
	Feeder Wire - Matls								
	Switches/Recpt.								
	Switchgear - Labor								
	Switchgear - Matls								
	Temporary - Materials								
	Temporary - Labor								
	Gas Generator - Materials								
	Gas Generator - Labor								
	Fixtures - Labor								
	Fixtures - Matls								
	Communications - Labor								
	Communications - Matls								
	Fire Alarm - Labor								
	Fire Alarm - Matls								
	Security - Labor								
	Security - Matls								
	Low Voltage Ltng Sys-Matls								
	Low Voltage Ltng Sys-Labor								
	Voice System - Materials								
	Voice System - Labor								
	Video System - Materials								
	Video System - Labor								
	Data System - Materials								
	Data System - Labor								
	Master Clock - Materials								
	Master Clock - Labor+B277								
	Coordination Drawings								
	Submittals/Closeout Documents								
	Supervision Clean-up								
	Div. 26 - Total								
	Divs. 31, 32 and 33 - Earthwork, Exterior Improvements and Utilities								
	Site Clearing & Grubbing								
	Building Pad - Materials								
	Building Pad - Labor								
	Paving Subgrade								
	Signage / Striping								
	Bike Racks								
	Landscaping - Materials								
	Landscaping - Labor								
	Hydro Mulch - Materials								
	Hydro Mulch - Labor								
	Irrigation - Materials								
	Irrigation - Labor								
	Earthwork								
	Finish Grading								
	Stabilization - Materials								
	Stabilization - Labor								
	Site Drainage - Materials								
	Site Drainage - Labor								

Item No.	Description of Work	Scheduled Value	Work Completed		Stored Materials	Total Completed	%	Balance To Finish	Retainage
			Previous App.	This App.					
	Chain Link Fence-Materials								
	Chain Link Fence-Labor								
	Paving - Labor								
	Paving - Materials								
	Sidewalks								
	Submittals/Closeout Documents								
	Supervision Clean-up								
	Div. 31, 32 and 33 - Total								
	General Conditions								
	Mobilization								
	Temp. Facilities								
	Final Cleaning								
	Record Documents/Closeout/ O&M Manuals								
	Supervision								
	Permits								
	Bonds								
	Insurance								
	Allowances								
	Alternates (list)								
	Change Orders								
	A. PR#								
	B. PR#								
	C. PR#								

END OF SECTION 01 29 73

SECTION 01 31 00 PROJECT MANAGEMENT AND COORDINATION

PART 1 GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section Includes:
   1. Administrative provisions for coordinating construction operations on Project including, but not limited to, the following:
      a. General coordination procedures.
      b. Coordination drawings.
      c. Pre-installation meetings.

B. Each contractor shall participate in coordination requirements. Certain areas of responsibility are assigned to a specific contractor.

C. Contractor shall make a reasonable attempt to interpret the Contract Documents before asking the Architect for assistance in interpretation. Requests for Information (RFI) will not be allowed from Sub-Contractors. The Contractor is to evaluate the Sub-Contractor's request and respond if the Contractor deems necessary the RFI will be forwarded to the Architect for a evaluation and response. The Contractor shall arrange the necessary meeting in the field with appropriate Architect's field representative(s) to obtain clarification as needed on items that may need interpretation, clarification and respond appropriately.

1.3 SUBMITTALS

A. Subcontract List:
   1. Prepare a written summary identifying individuals or firms proposed for each portion of the Work, including those who are to furnish products or equipment fabricated to a special design. Include the following information in tabular form:
      a. Name, address, and telephone number of entity performing subcontract or supplying products.
      b. Number and title of related Specification Section(s) covered by subcontract.
      c. Drawing number and detail references, as appropriate, covered by subcontract.

B. Key Personnel Names:
   1. Within 15 days of starting construction operations, submit a list of key personnel assignments, including superintendent and other personnel in attendance at Project site. Identify individuals and the duties and responsibilities; list address, telephone numbers (home, office, and cellular), and email addresses. Provide names, addresses, and telephone numbers of individuals assigned as alternates in the absence of individuals assigned to Project:
      a. Post copies of list in Project meeting room, in temporary field office, and by each temporary telephone. Keep list current at all times.

1.4 COORDINATION PROCEDURES

A. Coordinate construction operations to ensure efficient and orderly installation of each part of the Work. Coordinate construction operations that depend on each other for proper

installation, connection, and operation:
1. Schedule construction operations in sequence required to obtain the best results where installation of one part of the Work depends on installation of other components, before or after its own installation.
2. Coordinate installation of different components to ensure maximum performance and accessibility for required maintenance, service, and repair.
3. Make adequate provisions to accommodate items scheduled for later installation.

B. Prepare memoranda for distribution to each party involved, outlining special procedures required for coordination. Include items as required notices, reports, and list of attendees at meetings:
1. Prepare similar memoranda for Owner and separate contractors if coordination of the Work is required.

C. Administrative Procedures:
1. Coordinate scheduling and timing of required administrative procedures with other construction activities to avoid conflicts and to ensure orderly progress of the Work. Administrative activities include, but are not limited to, the following:
a. Preparation of Contractor's Construction Schedule.
b. Preparation of the schedule of values.
c. Installation and removal of temporary facilities and controls.
d. Delivery and processing of submittals.
e. Progress meetings.
f. Pre-installation conferences.
g. Project closeout activities.
h. Startup and adjustment of systems.
i. Coordinating inspections and other jurisdictional requirements.
j. Coordinate OFCI equipment.
k. Action items and issue logs.

D. Conservation:
1. Coordinate construction activities to ensure that operations are carried out with consideration given to conservation of energy, water, and materials. Coordinate use of temporary utilities to minimize waste:
a. Salvage materials and equipment involved in performance of, but not actually incorporated into, the Work. Refer to the Specifications Sections for disposition of salvaged materials that are designated as Owner's property.

1.5 COORDINATION DRAWINGS

A. Coordination Drawings, General:
1. Prepare coordination drawings according to requirements in individual Sections, and additionally where installation is not completely shown on shop drawings, where limited space availability necessitates coordination, or if coordination is required to facilitate integration of products and materials fabricated or installed by more than one entity:
a. Content:
1) Project-specific information, drawn accurately to a scale large enough to indicate and resolve conflicts. Do not base coordination drawings on standard printed data. Include the following information, as applicable:
a) Use applicable Drawings as a basis for preparation of coordination drawings. Prepare sections, elevations, and details as needed to describe relationship of various systems and components.
b) Coordinate the addition of trade specific information to the coordination drawings by multiple contractors in sequence that best provides for coordination of the information and resolution of conflicts between installed components before submitting for review.

c) Indicate functional and spatial relationships of components of architectural, structural, civil, mechanical, and electrical systems.
d) Indicate space requirements for routine maintenance and for anticipated replacement of components during the life of the installation.
e) Show location and size of access doors required for access to concealed dampers, valves, and other controls.
f) Indicate required installation sequences.
g) Indicate dimensions shown on the Drawings. Specifically note dimensions that appear to be in conflict with submitted equipment and minimum clearance requirements. Provide alternate sketches to Architect indicating proposed resolution of such conflicts. Minor dimension changes and difficult installations will not be considered changes to the Contract.

B. Coordination Drawing Organization:
1. Floor plans and reflected ceiling plans: Show architectural and structural elements, and mechanical, plumbing, fire-protection, fire-alarm, and electrical work. Show locations of visible ceiling-mounted devices relative to acoustical ceiling grid. Supplement plan Drawings with section drawings where required to adequately represent the Work.
2. Plenum space: Indicate subframing for support of ceiling and wall systems, mechanical and electrical equipment, and related work. Locate components within ceiling plenum to accommodate layout of light fixtures indicated on Drawings. Indicate areas of conflict between light fixtures, ductwork, piping, and other components.
3. Mechanical rooms: Provide coordination drawings for mechanical rooms showing plans and elevations of mechanical, plumbing, fire protection, fire-alarm, and electrical equipment.
4. Structural penetrations: Indicate penetrations and openings required for all disciplines.
5. Slab edge and embedded items: Indicate slab edge locations and sizes, and locations of embedded items for metal fabrications, sleeves, anchor bolts, bearing plates, angles, door floor closers, slab depressions for floor finishes, curbs and housekeeping pads, and similar items.
6. Mechanical and plumbing work - Show the following:
   a. Sizes and bottom elevations of ductwork, piping, and conduit runs, including insulation, bracing, flanges, and support systems.
   b. Dimensions of major components, such as dampers, valves, diffusers, access doors, cleanouts, and electrical distribution equipment.
   c. Fire-rated enclosures around ductwork.
7. Electrical work - Show the following:
   a. Runs of vertical and horizontal conduit 1-1/4 inches (32 mm) in diameter and larger.
   b. Light fixture, exit light, emergency battery pack, smoke detector, and other fire alarm locations.
   c. Panel board, switch board, switchgear, transformer, busway, generator, and motor control center locations.
   d. Location of pull boxes and junction boxes, dimensioned from column center lines.
   e. Floor boxes.
8. Fire protection system - Show the following:
   a. Locations of standpipes, mains piping, branch lines, pipe drops, sprinkler heads, and inspector test locations.
9. IDF/MDF rooms: Communications and low voltage (security, data, phone, etc.) audio.
10. Review: Architect will review coordination drawings to confirm that the Work is being coordinated, but not for the details of the coordination, which are Contractor's responsibility. If Architect determines that coordination drawings are not being prepared in sufficient scope or detail, or are otherwise deficient, Architect will so inform Contractor, who shall make changes as directed and resubmit.
11. Coordination drawing prints: Prepare coordination drawing prints according to

requirements in Section 01 33 00: Submittal Procedures.

C. Coordination Digital Data Files:
1. Prepare coordination digital data files according to the following requirements:
   a. File preparation format: Same digital data software program, version, and operating system as original Drawings.
   b. File submittal format: Submit or post coordination drawing files using same format as file preparation.
   c. BIM file incorporation:
      1) Develop and incorporate coordination drawing files into Building Information Model established for Project:
         a) Perform three-dimensional component conflict analysis as part of preparation of coordination drawings. Resolve component conflicts prior to submittal. Indicate where conflict resolution requires modification of design requirements by Architect.
   d. Architect will furnish Contractor one set of digital data files of Drawings for use in preparing coordination digital data files:
      1) Architect makes no representations as to the accuracy or completeness of digital data files as they relate to Drawings.
      2) Digital data software program: Drawings are available in Revit.
      3) Contractor shall execute a data licensing agreement in the form of AIA Document C106.

1.6 PROJECT MEETINGS

A. Schedule and conduct meetings and conferences at Project site unless otherwise indicated:
1. Attendees: Inform participants and others involved, and individuals whose presence is required, of date and time of each meeting. Notify Owner and Architect of scheduled meeting dates and times.
2. Agenda: Architect to prepare the meeting agenda and distribute the agenda to all invited attendees.
3. Minutes: Entity responsible for conducting meeting will record significant discussions and agreements achieved. Distribute the meeting minutes to everyone concerned, including Owner and Architect, within three days of the meeting.
4. Action items: An element of work, design, research, or other task to be completed before a specific date or time, such as before a subsequent meeting of involved parties.
5. Issue logs: Documentation element of software project management and contains a list of ongoing and closed issues of the Project.

B. Kick-off and Preconstruction Conference:
1. Architect will schedule and conduct a preconstruction conference before starting construction, at a time convenient to Owner and Architect:
   a. Conduct the conference to review responsibilities and personnel assignments.
   b. Attendees: Authorized representatives of Owner, Architect, and their consultants; Contractor and its superintendent; major subcontractors; suppliers; and other concerned parties shall attend the conference. Participants at the conference shall be familiar with the Project and authorized to conclude matters relating to the Work.
   c. Agenda: Discuss items of significance that affect progress.
   d. Minutes: Entity responsible for conducting meeting will record and distribute meeting minutes.
   e. Action items: An element of work, design, research, or other task to be completed before a specific date or time, such as before a subsequent meeting of involved parties.

C. Pre-Installation Conferences:
   1. Conduct a pre-installation trade conference at site before each construction activity that requires coordination with other construction trades:
      a. Attendees: Installer and representatives of manufacturers and fabricators involved in or affected by the installation and its coordination or integration with other materials and installations that have preceded or will follow, shall attend the meeting. Advise Architect and Engineer of Record of scheduled meeting dates.
      b. Agenda: Contractor to review progress of other construction activities and preparations for the particular activity under consideration.
      c. Contractor to record significant conference discussions, agreements, and disagreements, including required corrective measures and actions.
      d. Reporting: Contractor to distribute minutes of the meeting to each party present and to other parties requiring information.
      e. Do not proceed with installation if the conference cannot be successfully concluded. Initiate whatever actions are necessary to resolve impediments to performance of the Work and reconvene the conference at earliest feasible date.
      f. Action items: An element of work, design, research, or other task to be completed before a specific date or time, such as before a subsequent meeting of involved parties.

D. Project Closeout Conference:
   1. Schedule and conduct a Project closeout conference, at a time convenient to Owner and Architect, but no later than 90 days prior to the scheduled date of Substantial Completion:
      a. Conduct the conference to review requirements and responsibilities related to Substantial Completion.
      b. Attendees: Authorized representatives of Owner, Architect, and their consultants; Contractor and its superintendent; major subcontractors; suppliers; and other concerned parties shall attend the meeting. Participants at the meeting shall be familiar with the Project and authorized to conclude matters relating to the Work.
      c. Agenda: Discuss items of significance that could affect or delay Project closeout.
      d. Minutes: Entity conducting meeting will record and distribute meeting minutes.
      e. Action items: An element of work, design, research, or other task to be completed before a specific date or time, such as before a subsequent meeting of involved parties.

E. Progress Meetings:
   1. Conduct progress meetings at weekly intervals:
      a. Coordinate dates of meetings with preparation of payment requests.
      b. Attendees: In addition to representatives of Owner and Architect, each contractor, subcontractor, supplier, and other entity concerned with current progress or involved in planning, coordination, or performance of future activities shall be represented at these meetings. All participants at the meeting shall be familiar with the Project and authorized to conclude matters relating to the Work.
      c. Agenda:
         1) Review and correct or approve minutes of previous progress meeting. Review other items of significance that could affect progress. Include topics for discussion as appropriate to status of the Project:
            a) Contractor's Construction Schedule: Review progress since the last meeting. Determine whether each activity is on time, ahead of schedule, or behind schedule, in relation to Contractor's Construction Schedule. Determine how construction behind schedule will be expedited; secure commitments from parties involved to do so. Discuss whether schedule revisions are required to ensure that current and subsequent activities will be completed within the Contract Time.
      d. Minutes:

1) Entity responsible for conducting the meeting will record and distribute the meeting minutes to each party present and to parties requiring information:
   a) Schedule updating: Revise Contractor's Construction Schedule after each progress meeting where revisions to the schedule have been made or recognized. Issue revised schedule concurrently with the report of each meeting.
   b) Six (6) week look-ahead schedules. This may be altered to three (3) week look-ahead as part of an action item when Architect/District request:
      i. Action items: An element of work, design, research, or other task to be completed before a specific date or time, such as before a subsequent meeting of involved parties.

F. Coordination Meetings:
1. Conduct coordination meetings at weekly intervals. Project coordination meetings are in addition to specific meetings held for other purposes, such as progress meetings and pre-installation conferences:
   a. Attendees: In addition to representatives of Owner and Architect, each contractor, subcontractor, supplier, and other entity concerned with current progress or involved in planning, coordination, or performance of future activities shall be represented at these meetings. All participants at the meetings shall be familiar with the Project and authorized to conclude matters relating to the Work.
   b. Agenda:
      1) Review and correct or approve minutes of the previous coordination meeting. Review other items of significance that could affect progress. Include topics for discussion as appropriate to status of the Project:
         a) Combined Contractor's Construction Schedule: Review progress since the last coordination meeting. Determine whether each contract is on time, ahead of schedule, or behind schedule, in relation to combined Contractor's Construction Schedule. Determine how construction behind schedule will be expedited; secure commitments from parties involved to do so. Discuss whether schedule revisions are required to ensure that current and subsequent activities will be completed within the Contract Time.
         b) Schedule updating: Revise combined Contractor's Construction Schedule after each coordination meeting where revisions to the schedule have been made or recognized. Issue revised schedule concurrently with report of each meeting.
         c) Review present and future needs of each contractor present.
   c. Reporting: Record meeting results and distribute copies to everyone in attendance and to others affected by decisions or actions resulting from each meeting.
   d. Action items: An element of work, design, research, or other task to be completed before a specific date or time, such as before a subsequent meeting of involved parties.

PART 2 PRODUCTS (NOT USED)

PART 3 EXECUTION (NOT USED)

END OF SECTION 01 31 00

SECTION 01 32 33 PHOTOGRAPHIC DOCUMENTATION

PART 1 GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section includes administrative and procedural requirements for the following:
   1. Pre-construction photographs.
   2. Periodic construction photographs.
   3. Final completion construction photographs.

1.3 SUBMITTALS

A. Key Plan: Submit key plan of the Project site and building with notation of vantage points marked for location and direction of each photograph or video recording. Indicate elevation or story of construction. Include same information as corresponding photographic documentation.

B. Submit image files of digital photographs within three (3) days of taking photographs:
   1. Digital camera: Minimum sensor resolution of eight (8) megapixels.
   2. Format: Minimum 3200 by 2400 pixels, in unaltered original files, with same aspect ratio as the sensor, uncropped, date and time stamped, in folder named by date of photograph, accompanied by key plan file.
   3. Identification:
      a. Provide the following information with each image description in file metadata tag:
         1) Name of the Project.
         2) Name and contact information for the photographer.
         3) Name of Architect.
         4) Name of Contractor.
         5) Date photograph was taken.
         6) Description of vantage point, indicating location, direction (by compass point), and elevation or story of construction.
         7) Unique sequential identifier keyed to accompanying key plan.

1.4 QUALITY ASSURANCE

A. Photographer Qualifications: An individual who has been regularly engaged as a professional photographer of construction projects for not less than three (3) years.

B. Usage Rights:
   1. Obtain and transfer copyright usage rights from photographer to Owner for unlimited reproduction of photographic documentation.

PART 2 PRODUCTS

2.1 PHOTOGRAPHIC MEDIA

A. Digital Images: Provide images in JPG format, produced by a digital camera with minimum sensor size of eight (8) megapixels, and at an image resolution of not less than 3200 by

2400 pixels.

PART 3 EXECUTION

3.1 CONSTRUCTION PHOTOGRAPHS

A. Take photographs using the maximum range of depth of field, and that are in focus, to clearly show the Work. Photographs with blurry or out-of-focus areas will not be accepted:
   1. Maintain key plan with each set of construction photographs that identifies each photographic location.

B. Digital Images:
   1. Submit digital images exactly as originally recorded in the digital camera, without alteration, manipulation, editing, or modifications using image editing software:
      a. Date and time: Include date and time in file name for each image.
      b. Field office images: Maintain one set of images accessible in the field office at the Project site, available at all times for reference. Identify images in the same manner as those submitted to Architect.

C. Pre-Construction Photographs:
   1. Before commencement of the Work, take photographs of site and surrounding properties, including existing items to remain during construction, from different vantage points, as directed by Architect:
      a. Flag construction limits before taking construction photographs.
      b. Take a minimum of 20 photographs to show existing conditions adjacent to property before starting the Work.
      c. Take a minimum of 20 photographs of existing buildings either on or adjoining property to accurately record physical conditions at start of construction.
      d. Take additional photographs as required to record settlement or cracking of adjacent structures, pavements, and improvements.

D. Periodic Construction Photographs:
   1. Take a minimum of 20 photographs monthly, coinciding with cutoff date associated with each Application for Payment. Select vantage points to show status of construction and progress since last photographs were taken.

E. Architect Directed Construction Photographs:
   1. From time to time, Architect will instruct photographer about number and frequency of photographs and general directions on vantage points. Select actual vantage points and take photographs to show the status of construction and progress since last photographs were taken.

F. Time Lapse Sequence Construction Photographs:
   1. Take a minimum of 20 photographs as indicated, to show status of construction and progress since last photographs were taken:
      a. Frequency: Take photographs monthly, coinciding with the cutoff date associated with each Application for Payment.
      b. Vantage Points:
         1) Following suggestions by Architect and Contractor, photographer to select vantage points. During each of the following construction phases, take not less than two (2) of the required shots from same vantage point each time to create a time lapse sequence:
            a) Commencement of the Work, through completion of subgrade construction.
            b) Above grade structural framing.

c) Exterior building enclosure.
d) Interior work, through date of Substantial Completion.

G. Final Completion Construction Photographs:
1. Take a minimum of 20 color photographs after date of Substantial Completion for submission as Project record documents. Architect will inform photographer of desired vantage points:
   a. Do not include date stamp.

H. Additional Photographs:
1. Architect may request photographs in addition to periodic photographs specified. Additional photographs will be paid for by Change Order and are not included in the Contract Sum:
   a. Three (3) days' notice will be given, where feasible.
   b. In emergency situations, take additional photographs within 24 hours of request.
   c. Circumstances that could require additional photographs include, but are not limited to, the following:
      1) Special events planned at the Project site.
      2) Immediate follow up when onsite events result in construction damage or losses.
      3) Take photographs at fabrication locations away from site.
      4) Substantial Completion of a major phase or component of the Work.
      5) Extra record photographs at time of final acceptance.
      6) Owner's request for special publicity photographs.

END OF SECTION 01 32 33

SECTION 01 40 00 QUALITY REQUIREMENTS

PART 1 GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section includes administrative and procedural requirements for quality assurance and quality control.

B. Testing and inspecting services are required to verify compliance with requirements specified or indicated and paid by the District (or refer to Section 01 45 23: Testing and Inspecting Services). These services do not relieve Contractor of responsibility for compliance with the Contract Document requirements:
   1. Specific quality assurance and quality control requirements for individual construction activities are specified in the Sections that specify those activities. Requirements in those Sections may also cover production of standard products.
   2. Specified tests, inspections, and related actions do not limit Contractor's other quality assurance and quality control procedures that facilitate compliance with Contract Document requirements.
   3. Requirements for Contractor to provide quality assurance and quality control services required by Architect, Owner, or authorities having jurisdiction are not limited by provisions.
   4. Specific test and inspection requirements are not specified in this Section.

1.3 DEFINITIONS

A. Experienced: When used with an entity or individual, experienced means having successfully completed a minimum of five (5) years' documented experience with projects similar in nature, size, and extent; being familiar with special requirements indicated; and having complied with requirements of authorities having jurisdiction.

B. Field Quality Control Testing: Tests and inspections performed onsite for installation of the Work and for completed Work.

C. Installer/Applicator/Erector:
   1. Contractor or another entity engaged by Contractor as an employee, Subcontractor, or Sub-subcontractor, to perform particular construction operations, including installation, erection, application, and similar operations:
      a. Use of trade specific terminology in referring to a trade or entity does not require that certain construction activities be performed by accredited or unionized individuals, or that requirements specified apply exclusively to specific trade(s).

D. Mockups:
   1. Full size physical assemblies that are constructed onsite. Mockups are constructed to verify selections made under sample submittals; to demonstrate aesthetic effects and, where indicated, qualities of materials and execution; to review coordination, testing, or operation; to show interface between dissimilar materials; and to demonstrate compliance with specified installation tolerances. Mockups are not samples. Unless otherwise indicated, approved mockups establish the standard by which the Work will

be judged:

a. Laboratory mockups: Full size physical assemblies constructed at testing facility to verify performance characteristics.
b. Integrated exterior mockups: Mockups of exterior envelope erected separately from the building but on the Project site, consisting of multiple products, assemblies, and subassemblies.
c. Room mockups: Mockups of typical interior spaces complete with wall, floor, and ceiling finishes, doors, windows, millwork, casework, specialties, furnishings and equipment, and lighting.

E. Pre-Construction Testing: Tests and inspections performed specifically for the Project before products and materials are incorporated into the Work, to verify performance or compliance with specified criteria.

F. Product Testing: Tests and inspections that are performed by an NRTL, an NVLAP, or a testing agency qualified to conduct product testing and acceptable to authorities having jurisdiction, to establish product performance and compliance with specified requirements.

G. Quality Assurance Services: Activities, actions, and procedures performed before and during execution of the Work to guard against defects and deficiencies and substantiate that proposed construction will comply with requirements.

H. Quality Control Services: Tests, inspections, procedures, and related actions during and after execution of the Work to evaluate that actual products incorporated into the Work and completed construction comply with requirements. Services do not include Contract enforcement activities performed by Architect.

I. Source Quality Control Testing: Tests and inspections that are performed at the source, e.g., plant, mill, factory, or shop.

J. Testing Agency: An entity engaged to perform specific tests, inspections, or both. Testing laboratory shall mean the same as testing agency.

K. IR. Inspector of Record. District to employ or contract with a DSA Certified Inspector of Record for this project.

1.4 CONFLICTING REQUIREMENTS

A. Referenced Standards: If compliance with two (2) or more standards is specified and the standards establish different or conflicting requirements for minimum quantities or quality levels, comply with the most stringent requirement. Refer conflicting requirements that are different, but apparently equal, to Architect for a decision before proceeding.

B. Minimum Quantity or Quality Levels: The quantity or quality level shown or specified shall be the minimum provided or performed. The actual installation may comply exactly with the minimum quantity or quality specified, or it may exceed the minimum within reasonable limits. To comply with these requirements, indicated numeric values are minimum or maximum, as appropriate, for the context of requirements. Refer uncertainties to Architect for a decision before proceeding.

1.5 SUBMITTALS

A. Shop Drawings:
1. Submit Plans, Sections, and elevations, indicating materials and size of mockup construction:

a. Indicate manufacturer and model number of individual components.
b. Provide axonometric drawings for conditions difficult to illustrate in two dimensions.

B. Contractor's Statement of Responsibility:
1. When required by authorities having jurisdiction, submit copy of written statement of responsibility sent to authorities having jurisdiction before starting work on the following systems:
a. Seismic force resisting system, designated seismic system, or component listed in the designated seismic system quality assurance plan prepared by Architect.
b. Main wind force resisting system or wind resisting component listed in the wind force resisting system quality assurance plan prepared by Architect.

C. Schedule of Tests and Inspections:
1. Prepare in tabular form and include the following:
a. Specification Section number and title.
b. Entity responsible for performing tests and inspections.
c. Description of test and inspection.
d. Identification of applicable standards.
e. Identification of test and inspection methods.
f. Number of tests and inspections required.
g. Time schedule or time span for tests and inspections.
h. Requirements for obtaining samples.
i. Unique characteristics of each quality control service.

1.6 REPORTS AND DOCUMENTS

A. Test and Inspection Reports:
1. Prepare and submit certified written reports specified. Include the following:
a. Date of issue.
b. Project title and number.
c. Name, address, and telephone number of testing agency.
d. Dates and locations of samples and tests or inspections.
e. Names of individuals making tests and inspections.
f. Description of the Work and test and inspection method.
g. Identification of product and Specification Section.
h. Complete test or inspection data.
i. Test and inspection results and an interpretation of test results.
j. Record of temperature and weather conditions at time of sample taking and testing and inspecting.
k. Comments or professional opinion on whether tested or inspected Work complies with the Contract Document requirements.
l. Name and signature of laboratory inspector.
m. Recommendations on retesting and reinspecting.

B. Manufacturer's Technical Representative's Field Reports:
1. Prepare written information documenting manufacturer's technical representative's tests and inspections specified in other Sections. Include the following:
a. Name, address, and telephone number of technical representative making report.
b. Statement on condition of substrates and their acceptability for installation of product.
c. Statement that products at site comply with requirements.
d. Summary of installation procedures being followed, whether they comply with requirements and, if not, what corrective action was taken.
e. Results of operational and other tests and a statement of whether observed performance complies with requirements.
f. Statement whether conditions, products, and installation will affect warranty.

g. Other required items indicated in individual Specification Sections.

C. Factory Authorized Service Representative's Reports:
1. Prepare written information documenting manufacturer's factory authorized service representative's tests and inspections specified in other Sections. Include the following:
a. Name, address, and telephone number of factory authorized service representative making report.
b. Statement that equipment complies with requirements.
c. Results of operational and other tests and a statement of whether observed performance complies with requirements.
d. Statement whether conditions, products, and installation will affect warranty.
e. Other required items indicated in individual Specification Sections.

D. Permits, Licenses, and Certificates: For Owner's records, submit copies of permits, licenses, certifications, inspection reports, releases, jurisdictional settlements, notices, receipts for fee payments, judgments, correspondence, records, and similar documents, established for compliance with standards and regulations bearing on performance of the Work.

E. Trade Pre-Installation Conferences: Meeting minutes to be Contractor provided.

1.7 QUALITY ASSURANCE

A. Qualifications establish the minimum qualification levels required; refer to individual Specification Sections for additional requirements.

B. Manufacturer Qualifications: A firm experienced in manufacturing products or systems similar to those indicated and sufficient production capacity to produce required units.

C. Fabricator Qualifications: A firm experienced in producing products similar to those indicated and with record of successful in-service performance, as well as sufficient production capacity to produce required units.

D. Installer Qualifications: A firm or individual experienced in installing, erecting, or assembling work similar in material, design, and extent to that indicated for this Project, whose work has resulted in construction with a record of successful in-service performance.

E. Professional Engineer Qualifications: A professional engineer who is legally qualified to practice in the State of California and is experienced in providing engineering services of the kind indicated. Engineering services are defined as those performed for installations of the system, assembly, or product that are similar in material, design, and extent to those indicated.

F. Specialists:
1. Certain Specification Sections require that specific construction activities shall be performed by entities who are recognized experts in those operations. Specialists shall satisfy qualification requirements indicated and shall be engaged for the activities indicated:
a. Requirements of authorities having jurisdiction supersede requirements for specialists.

G. Testing Agency Qualifications:
1. A NRTL, a NVLAP, or an independent agency with the experience and capability to conduct testing and inspecting indicated, documented according to ASTM E329; with additional qualifications specified in individual Sections; and, where required by authorities having jurisdiction, that is acceptable to authorities:

a. NRTL: A nationally recognized testing laboratory according to 29 CFR 1910.7.
b. NVLAP: A testing agency accredited according to NIST's National Voluntary Laboratory Accreditation Program.

H. Manufacturer's Technical Representative Qualifications: An authorized representative of the manufacturer who is trained and approved by the manufacturer to observe and inspect installation of the manufacturer's products.

I. Factory Authorized Service Representative Qualifications: An authorized representative of the manufacturer who is trained and approved by the manufacturer to inspect installation of the manufacturer's products.

J. Pre-Construction Testing:
1. Where testing agency is indicated to perform pre-construction testing for compliance with specified requirements for performance and test methods, comply with the following:
   a. Contractor responsibilities include the following:
      1) Provide test specimens representative of proposed products and construction.
      2) Submit specimens with sufficient time for testing and analyzing results to prevent delaying the Work.
      3) Provide sizes and configurations of test assemblies, mockups, and laboratory mockups to adequately demonstrate capability of products to comply with performance requirements.
      4) Build site assembled test assemblies and mockups using installers who will perform same tasks for the Project.
      5) Build laboratory mockups at testing facility using personnel, products, and methods of construction indicated for the completed Work.
      6) When testing is complete, remove test specimens, assemblies, mockups, and laboratory mockups; do not reuse products on the Project.
2. Testing agency responsibilities: Submit certified written report of each test, inspection, and similar quality assurance service to Architect, with copy to Contractor. Interpret tests and inspections and state in each report whether tested and inspected Work complies with or deviates from the Contract Documents.

K. Mockups:
1. Before installing portions of the Work requiring mockups, build mockups for each form of construction and finish required to comply with the following requirements, using materials indicated for the completed Work:
   a. Build mockups in location and of size indicated, or if not indicated, as directed by Architect.
   b. Notify Architect a minimum of seven (7) days in advance of dates and times when mockups will be constructed.
   c. Employ supervisory personnel who will oversee mockup construction. Employ workers that will be employed during the construction.
   d. Demonstrate the proposed range of aesthetic effects and workmanship.
   e. Obtain Architect's approval of mockups before starting Work, fabrication, or construction. Allow seven (7) days for initial review and each re-review of each mockup.
   f. Maintain mockups during construction in an undisturbed condition as a standard for judging the completed Work.
   g. Demolish and remove mockups when directed unless otherwise indicated.

L. Integrated Exterior Mockups: Mockup of the exterior envelope erected separately from the building but on the Project site, consisting of multiple products, assemblies, and subassemblies. Mockup, if not specifically shown on the Drawings, shall be minimum eight

feet by eight feet (8'x8'). Mockup shall include all major façade elements and at least one (1) window a minimum of two feet by two feet (2'x2') in size. Prior to constructing mockup, verify requirements with Architect. Pre-installation conferences for trades involved in integrated exterior mockup shall be held after mockup is completed.

M. Laboratory Mockups: Comply with requirements of pre-construction testing and those specified in individual Specification Sections.

N. Trade Pre-Installation Conferences: Meeting minutes to be Contractor provided.

1.8 QUALITY CONTROL

A. Owner Responsibilities:
   1. Where quality control services are indicated as Owner's responsibility, Owner will engage a qualified testing agency to perform the services:
      a. Owner will furnish Contractor with names, addresses, and telephone numbers of testing agencies engaged and a description of types of testing and inspecting they are engaged to perform.
      b. Costs for retesting and re-inspecting construction that replaces or is necessitated by Work that failed to comply with the Contract Documents will be charged to Contractor, and the Contract Sum will be adjusted by Change Order.

B. Contractor Responsibilities:
   1. Tests and inspections not explicitly assigned to Owner are Contractor's responsibility. Perform additional quality control activities required to verify that the Work complies with requirements, whether specified or not:
      a. Unless otherwise indicated, provide quality control services specified and those required by authorities having jurisdiction. Perform quality control services required of Contractor by authorities having jurisdiction, whether specified or not.
      b. Where services are indicated as Contractor's responsibility, engage a qualified testing agency to perform the quality control services. Contractor shall not employ same entity engaged by Owner, unless agreed to in writing by Owner.
      c. Notify testing agencies at least 24 hours in advance of time when Work that requires testing or inspecting will be performed.
      d. Where quality control services are indicated as Contractor's responsibility, submit a certified written report, in duplicate, of each quality control service.
      e. Testing and inspecting requested by Contractor and not required by the Contract Documents are Contractor's responsibility.
      f. Submit additional copies of each written report directly to authorities having jurisdiction when they so direct.
      g. Provide documentation for construction safety as required by CBC Chapter 33 and CFC Chapter 33. Show representation for construction safeguards through the life of the Project.

C. Manufacturer's Field Services: Where indicated, engage a factory authorized service representative to inspect field assembled components and equipment installation, including service connections. Report results in writing as specified in Section 01 33 00: Submittal Procedures.

D. Manufacturer's Technical Services: Where indicated, engage a manufacturer's technical representative to observe and inspect the Work. Manufacturer's technical representative's services include participation in pre-installation conferences, examination of substrates and conditions, verification of materials, observation of installer activities, inspection of completed portions of the Work, and submittal of written reports.

E. Retesting/Re-Inspecting: Regardless of whether original tests or inspections were

Contractor's responsibility, provide quality control services, including retesting and re-inspecting, for construction that replaced Work that failed to comply with the Contract Documents.

F. Testing Agency Responsibilities:
1. Cooperate with Architect and Contractor in performance of duties. Provide qualified personnel to perform required tests and inspections:
   a. Notify Architect and Contractor promptly of irregularities or deficiencies observed in the Work during performance of its services.
   b. Determine the location from which test samples will be taken and in which in-situ tests are conducted.
   c. Conduct and interpret tests and inspections and state in each report whether tested and inspected Work complies with or deviates from requirements.
   d. Submit a certified written report, in duplicate, of each test, inspection, and similar quality control service through Contractor.
   e. Do not release, revoke, alter, or increase the Contract Document requirements or approve or accept any portion of the Work.
   f. Do not perform any duties of Contractor.

G. Associated Services:
1. Cooperate with agencies performing required tests, inspections, and similar quality control services, and provide reasonable auxiliary services as requested. Notify agency sufficiently in advance of operations to permit assignment of personnel. Provide the following:
   a. Access to the Work.
   b. Incidental labor and facilities necessary to facilitate tests and inspections.
   c. Adequate quantities of representative samples of materials that require testing and inspecting. Assist agency in obtaining samples.
   d. Facilities for storage and field curing of test samples.
   e. Delivery of samples to testing agencies.
   f. Preliminary design mix proposed for use for material mixes that require control by testing agency.
   g. Security and protection for samples and for testing and inspecting equipment at the Project site.

H. Coordination:
1. Coordinate sequence of activities to accommodate required quality assurance and quality control services with a minimum of delay and to avoid necessity of removing and replacing construction to accommodate testing and inspecting:
   a. Schedule times for tests, inspections, obtaining samples, and similar activities.

I. Schedule of Tests and Inspections:
1. Prepare a schedule of tests, inspections, and similar quality control services required by the Contract Documents. Coordinate and submit concurrently with Contractor's Construction Schedule. Update as the Work progresses:
   a. Distribution: Distribute schedule to Owner, Architect, testing agencies, and each party involved in performance of portions of the Work where tests and inspections are required.

1.9 SPECIAL TESTS AND INSPECTIONS

A. Special Tests and Inspections:
1. Owner will engage a qualified testing agency or special inspector to conduct special tests and inspections, as required by authorities having jurisdiction, as the responsibility of Owner, and as indicated in individual Specification Sections:
   a. Verifying that manufacturer maintains detailed fabrication and quality control

procedures, and reviews the completeness and adequacy of those procedures to perform the Work.
b. Notifying Architect and Contractor promptly of irregularities and deficiencies observed in the Work during performance of its services.
c. Submitting a certified written report of each test, inspection, and similar quality control service to Architect with copy to Contractor and to authorities having jurisdiction.
d. Submitting a final report of special tests and inspections at Substantial Completion, which includes a list of unresolved deficiencies.
e. Interpreting tests and inspections and stating in each report whether tested and inspected Work complies with or deviates from the Contract Documents.
f. Retesting and re-inspecting corrected Work.

PART 2 PRODUCTS (NOT USED)

PART 3 EXECUTION

3.1 TEST AND INSPECTION LOG

A. Test and Inspection Log:
1. Prepare a record of tests and inspections. Include the following:
a. Date test or inspection was conducted.
b. Description of the Work tested or inspected.
c. Date test or inspection results were transmitted to Architect.
d. Identification of testing agency or special inspector conducting test or inspection.

B. Maintain log at site. Post changes and revisions as they occur. Provide access to test and inspection log for Architect's reference during normal working hours.

3.2 REPAIR AND PROTECTION

A. On completion of testing, inspecting, sample taking, and similar services, repair damaged construction and restore substrates and finishes:
1. Provide materials and comply with installation requirements specified in other Specification Sections or matching existing substrates and finishes. Restore patched areas and extend restoration into adjoining areas with durable seams that are as invisible as possible. Comply with the Contract Document requirements for cutting and patching in Section 01 73 29: Cutting and Patching.

B. Protect construction exposed by or for quality control service activities.

C. Repair and protection are Contractor's responsibility, regardless of the assignment of responsibility for quality control services.

END OF SECTION 01 40 00

SECTION 01 45 23 TESTING AND INSPECTING SERVICES

PART 1 GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section includes requirements and qualifications including but not limited to:
   1. Professional testing and laboratory services.
   2. Accessories necessary for the completion of testing and laboratory services.

B. Testing and inspecting services are required to verify compliance with requirements specified or indicated. These services do not relieve Contractor of responsibility for compliance with the Contract Document requirements:
   1. Specific quality assurance and quality control requirements for individual construction activities are specified in the Sections that specify those activities. Requirements in those Sections may also cover production of standard products.
   2. Specified tests, inspections, and related actions do not limit Contractor's other quality assurance and quality control procedures that facilitate compliance with Contract Document requirements.
   3. Requirements for Contractor to provide quality assurance and quality control services required by Architect, Owner, or authorities having jurisdiction are not limited by provisions.
   4. Specific test and inspection requirements are not specified in this Section.

C. A Qualified Independent Testing Laboratory and/or Geotechnical Engineering Service Selected and Paid by Owner:
   1. Owner will pay for the initial laboratory services of materials that comply with the requirements of the Contract Documents. Contractor shall pay for testing and retesting of materials that do not comply with the requirements of the Contract Documents.

D. Inspecting agency shall perform inspections and tests in accordance with the rules and regulations of the building code, local authorities, specifications of ASTM, and the Contract Documents.

E. Materials and workmanship found not in compliance with required standards or performance obligations shall be removed and replaced. Replacement and subsequent testing shall be at Contractor’s expense.

F. Where terms “Inspector” and “Laboratory” are used, it is meant and in reference to an officially designated and accredited inspector of the testing laboratory or geotechnical service engaged by Owner.

G. Laboratory inspections shall not relieve Contractor or fabricator of his responsibility to furnish materials and workmanship in accordance with the Contract Documents.

H. Contractor or fabricator shall cooperate with the testing laboratory in matters pertaining to the Work.

I. Contractor to address deficiency and failed reports.

1.3 SUBMITTALS

A. Schedule of Tests and Inspections:
   1. Prepare a schedule of tests, inspections, and similar quality control services required by the Contract Documents. Coordinate and submit concurrently with Contractor's Construction Schedule. Update as the Work progresses:
      a. Prepare in tabular form and include the following:
         1) Specification Section number and title.
         2) Entity responsible for performing test and inspection.
         3) Description of test and inspection.
         4) Identification of applicable standards.
         5) Identification of test and inspection methods.
         6) Number of tests and inspections required.
         7) Time schedule or time span for tests and inspections.
         8) Requirements for obtaining samples.
         9) Unique characteristics of each quality control service.

B. Test and Inspection Reports:
   1. Prepare and submit certified written reports specified. Include the following:
      a. Date of issue.
      b. Project title and number.
      c. Name, address, and telephone number of testing agency.
      d. Dates and locations of samples and tests or inspections.
      e. Names of individuals making tests and inspections.
      f. Description of the Work and test and inspection method.
      g. Identification of product and Specification Section.
      h. Complete test or inspection data.
      i. Test and inspection results and an interpretation of test results.
      j. Record of temperature and weather conditions at time of sample taking and testing and inspecting.
      k. Comments or professional opinion on whether tested or inspected Work complies with the Contract Document requirements.
      l. Name and signature of laboratory inspector.
      m. Recommendations on retesting and re-inspecting.

C. Submit copies of reports of each inspection and test:
   1. Owner, program or project manager, Architect, and each engineer or outside consultants regarding their particular phase of the Project: One (1) copy each.
   2. Construction Manager (CM) and Contractor: Two (2) copies each.

D. In addition to furnishing a written report, notify the CM and Contractor verbally of uncorrected conditions or failures to comply with requirements of the Contract Documents, and immediately fax and email corresponding report to Architect and the engineer.

E. At completion of each trade or branch of Work requiring inspecting and testing, submit a final certificate attesting to satisfactory completion of Work.

F. Report full compliance with requirements of the Contract Documents.

G. Submit copies of test results sealed by a registered engineer to municipal authorities having jurisdiction, as required.

1.4 QUALITY ASSURANCE

A. Testing Agency Qualifications:

B. Inspection and testing services for the testing agency shall be under the direction of a California Registered Engineer, charged with engineering managerial responsibility, and having a minimum of five (5) years' engineering experience in inspection and testing of construction materials.

C. Concrete Inspectors: Inspecting personnel monitoring concrete work shall be ACI certified inspectors.

D. Structural Steel:
   1. Primary inspectors performing structural steel inspection shall be currently certified AWS Certified Welding Inspectors (CWI), in accordance with the provisions of AWS QCI, *Standard and Guide for Qualification and Certification of Welding Inspectors*:
      a. Inspector may be supported by assistant inspectors who perform specific inspection functions under the direct supervision of the primary inspector. Assistant inspectors shall be currently certified AWS Certified Associate Welding Inspectors (CAWI). Work of assistant inspectors shall be monitored daily by the inspector.

E. Testing Equipment: Equipment shall be calibrated at intervals not exceeding 12 months by devices of accuracy traceable to the National Bureau of Standards.

F. Referenced Standards: Latest adopted edition of standards referenced apply to the Work. In the event of conflict between the Contract Documents and referenced standards, the Contract Documents shall govern. In case of conflict between Contract Documents and the California Building Code, the more stringent shall govern.

G. Owner Responsibilities:
   1. Where quality control services are indicated as Owner's responsibility, Owner will engage a qualified testing agency to perform the services:
      a. Owner will furnish Contractor with names, addresses, and telephone numbers of testing agencies engaged and a description of types of testing and inspecting they are engaged to perform.
      b. Costs for retesting and re-inspecting construction that replaces or is necessitated by Work that failed to comply with the Contract Documents will be charged to Contractor, and the Contract Sum will be adjusted by Change Order.

H. Contractor Responsibilities:
   1. Tests and inspections not explicitly assigned to Owner are Contractor's responsibility. Perform additional quality control activities required to verify that the Work complies with requirements, whether specified or not:
      a. Refer to individual Specification Sections for specific requirements.
      b. Unless otherwise indicated, provide quality control services specified and those required by authorities having jurisdiction. Perform quality control services required of Contractor by authorities having jurisdiction, whether specified or not.
      c. Where services are indicated as Contractor's responsibility, engage a qualified testing agency to perform the quality control services. Contractor shall not employ same entity engaged by Owner, unless agreed to in writing by Owner.
      d. Notify testing agencies at least 24 hours in advance of time when Work that requires testing or inspecting will be performed.
      e. Where quality control services are indicated as Contractor's responsibility, submit a certified written report, in duplicate, of each quality control service.
      f. Testing and inspecting requested by Contractor and not required by the Contract Documents are Contractor's responsibility.
      g. Submit additional copies of each written report directly to authorities having jurisdiction when they so direct.
      h. Associated responsibilities and services - Cooperate with agencies performing required tests, inspections, and similar quality control services, and provide

reasonable auxiliary services as requested. Notify agency sufficiently in advance of operations to permit assignment of personnel:

1) Provide the following:
   a) Provide access to the Work.
   b) Deliver of samples to testing laboratory, without cost to Owner, in adequate quantities of representative samples of materials that require testing and inspecting. Assist agency in obtaining samples.
   c) Advise laboratory and Architect sufficiently in advance of construction operations to allow laboratory to complete required inspections or tests and to assign personnel for field inspection and testing as specified.
   d) Provide facilities for storage and curing of concrete test samples on site for the first 24 hours and for subsequent field curing required by ASTM C31.
   e) Incidental labor, facilities, and equipment necessary to assist laboratory personnel in obtaining and handling samples at the site.
   f) Preliminary design mix proposed for use for material mixes that require control by testing agency.
   g) Provide concrete mix designs in accordance with ACI 301 made by an independent testing laboratory or qualified concrete supplier. Where mix designs by an independent testing laboratory are required, select and pay for laboratory.
   h) Obtain required inspections or approvals of the building official. Inspection requests and notifications required by building code are responsibility of Contractor.
   i) Provide current welder certificates for each welder employed.
   j) Provide fabrication and erection inspection and testing of welds in accordance with AWS D1.1, Chapter 6.
   k) Use prequalification of welding procedures in executing the Work.
   l) Security and protection for samples and for testing and inspecting equipment at the Project site.

i. Retesting/re-inspecting: Regardless of payment responsibility of the original tests or inspections, provide quality control services, including retesting and re-inspecting, for construction that replaced Work failing to comply with the Contract Documents, code requirements.

I. Testing Agency Responsibilities:

1. Cooperate with Architect and Contractor in performance of duties. Provide qualified personnel to perform required tests and inspections:
   a. Notify Architect and Contractor promptly of irregularities or deficiencies observed in the Work during performance of its services.
   b. Determine the location from which test samples will be taken and in which in-situ tests are conducted.
   c. Conduct and interpret tests and inspections and state in each report whether tested and inspected Work complies with or deviates from requirements.
   d. Submit a certified written report, in duplicate, of each test, inspection, and similar quality control service through Contractor.
   e. Do not release, revoke, alter, or increase the Contract Document requirements or approve or accept any portion of the Work.
   f. Do not perform any duties of Contractor.

J. Authority and Duties of Laboratory Personnel:

1. A representative of the testing laboratory, who has reviewed and is familiar with the Project and Specifications, shall participate in pre-construction conferences. The representative shall coordinate material testing and inspection requirements with Contractor and its subcontractors consistent with the planned construction schedule. The laboratory representative shall attend conferences required or requested to

address quality control issues.
2. Laboratory personnel shall inspect and test materials, assemblies, specimens, and Work performed, including design mixes, methods and techniques, and report the progress to Architect.
3. If material or Work fails to meet requirements of the Contract Documents, the laboratory inspector shall notify the CM, Architect, engineers, supplier, or Subcontractor providing or preparing the materials or Work being tested of such failure.
4. Laboratory personnel shall not perform the work of Contractor or act as foremen or superintendents. Work will be inspected as it progresses, but failure to detect defective Work or materials shall not prevent later rejection when a defect is discovered.
5. Laboratory personnel are not authorized to revoke, alter, relax, enlarge, or release the requirements of the Contract Documents or approve or accept portions of Work, except where approval is specifically specified in the Specifications.
6. Comply with building code requirements for special inspections.

K. Testing Laboratory Guidelines and Procedures:
1. Technicians scheduled to perform specific testing services must be qualified to review and perform other services that overlap, i.e. earthwork, foundation inspections, rebar inspection, and concrete when scheduled concurrently at the site.
2. Technician time for services performed will be reimbursed at a regular time rate. Compensation at the overtime rate will be considered for hours over eight (8) hours spent at the site on a single day, field testing services performed on a Saturday or Sunday, and field services performed on a recognized holiday.
3. There shall be a three (3) hour minimum for each scheduled testing service. Vehicle charges will be included on a $25.00 per trip basis.
4. Cylinder pick up will be controlled by the technician performing test on a scheduled pick up day. If there are no testing services scheduled, the cylinder pick up fee is $40.00 on week days and $50.00 on weekends and holidays with no technician or vehicle charge.
5. Contractor shall bear the responsibility of scheduling the testing services. Contractor and the testing laboratory shall assume full responsibility to coordinate the testing services. Cancellations or failed test shall be reimbursable to the Owner by the responsible party for the cancellations or failure of a test or service.

L. Coordination:
1. Coordinate sequence of activities to accommodate required quality assurance and quality control services with a minimum of delay and to avoid necessity of removing and replacing construction to accommodate testing and inspecting:
   a. Schedule times for tests, inspections, obtaining samples, and similar activities.

PART 2 PRODUCTS (NOT USED)

PART 3 EXECUTION

3.1 TEST AND INSPECTION LOG

A. Test and Inspection Log:
1. Prepare a record of tests and inspections. Include the following:
   a. Date test or inspection was conducted.
   b. Description of the Work tested or inspected.
   c. Date test or inspection results were transmitted to Architect.
   d. Identification of testing agency or special inspector conducting test or inspection.
   e. Deficiency log.

B. Maintain log at site. Post changes and revisions as they occur. Provide access to test and

inspection log for Architect's reference during normal working hours.

3.2 TESTING AND INSPECTION SERVICES

A. Testing services shall include, but not be limited to those specified below or which are necessary or required during course of construction to ascertain Specification compliance and which may be deemed necessary by Architect, the engineer, or Owner to ensure the quality of the Work.

B. Owner reserves the right to add to or delete any or all inspection and testing specified, excluding testing required by the applicable building codes.

C. If conflicts arise between Drawings and Specifications, notify Architect immediately. The most stringent requirements shall dictate procedure.

3.3 TESTING OF EARTHWORK

A. Testing Services (as specified or required):
   1. References (as applicable for tests required):
      a. American Society for Testing and Materials (ASTM):
         1) D698 - Test Method for Laboratory Compaction Characteristics of Soil Using Standard Effort (12,400 ft-lb/ft^3 (600 kN-m/m^3).
         2) D2922 - Standard Test Method for Density of Soil and Soil-Aggregate In Place By Nuclear Methods (Shallow Depth).
         3) D4318 - Standard Test Method for Liquid Limit, Plastic Limit, and Plasticity Index of Soils.
      b. American Association of State Highway and Transportation Officials (AASHTO):
         1) T89 - Determining the Liquid Limit of Soils.
         2) T90 - Determining the Plastic Limit and Plasticity Index of Soils.
         3) T99 - Moisture-Density Relations of Soils Using a 2.5 kg (5.5 lb) Rammer and a 305-mm (12-in) Drop.
         4) T238 - Density of Soil and Soil Aggregates In Place By Nuclear Methods (Shallow Depth).
   2. Perform sieve analysis to develop grain size distribution curves for materials to be used for subgrade, fill under slab on grade, and backfills.
   3. Establish the moisture density relation of soils to be used as fill using the method best suited to the type of fill material.
   4. Determine moisture content of all fill materials before placement and advise Contractor when it is or is not suitable to achieve required compaction.
   5. Determine Liquid Limit in accordance with ASTM D4318 or AASHTO T89, Plastic Limit in accordance with ASTM D4318, and Plasticity Index in accordance with ASTM D4318 of all fill material,
   6. Perform one (1) in place density test for each 2,500 square feet (280 square yards) of existing subgrade material.
   7. Perform Moisture-Density curve in accordance with ASTM D698 or AASHTO T99 for one type of fill material. If the original choice of material does not meet the Specifications, Contractor shall pay for additional testing.
   8. Perform in place density tests of each lift of compacted fill at locations adequate to evaluate the degree of compaction of all fill areas. Conduct one test for each 2,500 square feet (280 square yards) of each lift of compacted fill.
   9. Perform testing at a frequency of one (1) in-place density and moisture test for each 75 lineal feet or less of utility trench, with a minimum of three (3) tests per lift

B. Reports:
   1. Submit reports with the following information:
      a. Type and condition of soil at footing bottoms.

b. Level of water table in the excavated areas.
c. Grain size distribution of fill materials (average of three [3] tests).
d. Moisture density test results.
e. In place density test results with moisture content and relative density of each layer of compacted fill. Include with in place density test results, a plan showing location of each test.
f. Notify Architect by telephone within one (1) hour of the discovery of the following conditions and follow up telephone notification with written report:
   1) Materials used or degree of soil compaction not meeting specified requirements.
   2) Frost and freeze protection requirements for excavation bottoms not being complied with.
   3) Water in excavations not being removed prior to Work being performed in excavation.

3.4 INSPECTION OF PIPED SITE UTILITIES

A. Laboratory representative shall observe and report on the following:
   1. Proper alignment and grade of trenches.
   2. Pipe bedding and supports.
   3. Pipe, joints, jointing material, and thrust blocks prior to installation of pipe.
   4. Installation of pipe and joints.
   5. Testing of piped utilities performed by Contractor.

3.5 PAVING

A. Testing Services:
   1. Perform field tests for moisture density properties:
      a. Provide field testing of the subgrade as specified.
      b. Paving sub-base: Provide one (1) field test for every 5,000 square feet of area of crushed limestone or caliche sub-base.
      c. Lime treated subgrade: Provide one (1) field test for every 5,000 square feet of area of lime treated subgrade for content of lime and subgrade compaction.
      d. Cement soil stabilization: Provide one (1) field test for every 5,000 square feet of area of cement stabilized subgrade for content of cement and subgrade compaction.

3.6 PIER DRILLING OPERATION

A. A representative of a qualified geotechnical laboratory shall provide services specified.

B. Laboratory representative shall make continuous inspections to determine that proper bearing stratum is obtained and utilized for bearing and that shafts are properly clean and dry before placing concrete.

C. Laboratory shall furnish complete pier log showing the diameter, top and bottom elevations of each pier, casing required or not required, actual penetration into bearing stratum, elevation of top of bearing stratum, volume of concrete used, and deviations from specified tolerances.

D. Laboratory representative shall make continuous inspections of drilled pier construction to check the following:
   1. Verify soundness of bearing stratum and desired penetration.
   2. Verify pier dimensions and reinforcing used.
   3. Monitor condition of hole and removal of water and loose material from bottom.

4. Monitor placement of concrete and use of tremie or pumps.
5. Monitor the extraction of casing, if used.

E. Request probe holes when deemed necessary to confirm safe bearing capacity.

3.7 CONCRETE REINFORCING STEEL AND EMBEDDED METAL ASSEMBLIES

A. Inspect concrete reinforcing steel prior to placing concrete for compliance with Contract Documents and approved shop drawings. Noncompliance with Contract Documents and approved shop drawings shall be immediately brought to the attention of Contractor for correction and, if left uncorrected, reported to Architect.

B. Laboratory representative shall observe and report on the following:
1. Number and size of bars.
2. Bending and lengths of bars.
3. Splicing.
4. Clearance to forms, including chair heights.
5. Clearance to sides and bottom of trench if soil formed.
6. Clearance between bars or spacing.
7. Rust, form oil, and other contamination.
8. Grade of steel.
9. Securing, tying, and chairing of bars.
10. Excessive congestion of reinforcing steel.
11. Installation of anchor bolts and placement of concrete around such bolts.
12. Fabrication and installation of embedded metal assemblies, including visual inspection of all welds.
13. Visually inspect studs and deformed bar anchors on embedded assemblies for compliance with Contract Documents. Check number, spacing, and weld quality. If, after welding, visual inspection reveals that a sound weld or a full 360-degree fillet has not been obtained for a particular stud or bar, such stud or bar shall be struck with a hammer and bent 15 degrees off perpendicular and then bent back into position. Anchors failing this test shall be replaced.

C. Provide a qualified, experienced inspector to inspect reinforcing steel. Inspector shall have a minimum of three (3) years of experience inspecting reinforcing steel in projects of similar size.

3.8 CONCRETE INSPECTION AND TESTING

A. Receive and evaluate proposed concrete mix designs submitted by Contractor. If mix designs comply with Drawings and Specifications, the laboratory shall submit a letter to the Architect certifying compliance. Mix designs not complying with Drawings and Specifications shall be returned by the laboratory as being unacceptable. Check the proposed mixes for proportions, water cement ratio, and slump in accordance with ACI 613 and 318.

B. Comply with ACI 311 *Guide For Concrete Inspection* and ACI *Manual of Concrete Inspection*.

C. Sample and test concrete placed at the site in accordance with ASTM C172. Each sample shall be obtained from a different batch of concrete on a random basis.

D. Test concrete:
1. Mold and cure five (5) specimens from each sample:
   a. For each 50 cubic yards or fraction thereof of structural building concrete.
   b. For each 100 cubic yards or fraction thereof of nonstructural concrete and site

Work paving and sidewalks.
c. Laboratory cure two (2) cylinders in accordance with ASTM C192.
d. Field cure remaining cylinders in accordance with ASTM C31.
2. Two (2) specimens shall be tested at seven (7) days for information, two (2) shall be tested at 28 days for acceptance.
3. Store one (1) cylinder for testing at 56 days in the event the 28-day strength tests do not meet strength requirements.

E. Deviations from the requirements of ASTM specifications shall be recorded in the test report. Test concrete specimens in accordance with ASTM C39.

F. Specimens for pumped concrete shall be taken at the discharge end of pumping equipment.

G. Supervise curing and protection provided for test specimens in field and transportation from the field to laboratory. Test cylinders shall be stored in the field for 24 hours and then carefully transported to laboratory and cured in accordance with ASTM C31.

H. Make one (1) strength test (four [4] cylinders) of each mix design of concrete placed in any one (1) day.

I. Make one (1) slump test for each set of cylinders following procedural requirements of ASTM C143 and ASTM C172. Make additional slump tests whenever consistency of concrete appears to vary. Slump tests corresponding to samples from which strength tests are made shall be reported with strength test results. Other slump tests need not be reported.

J. Determine total air content of air entrained normal weight concrete sample for each strength test in accordance with ASTM C231.

K. Determine air content and unit weight of lightweight concrete sample for each strength test in accordance with ASTM C173 and ASTM C567.

L. Determine temperature of concrete sample for each strength test.

M. Inspect each batch of concrete and monitor addition of mixing water to assure uniform consistency from truck to truck. Check mixing form mixers before mix begins to set and within time limits set forth in ASTM C94:
1. Monitor addition of water and high range water reducer to concrete at job site and length of time concrete is allowed to remain in truck during placement.

N. Testing agency shall furnish and maintain a competent inspector at the mixing plant at the start of each day's mixing. Inspector shall examine concrete materials for compliance with Specifications and approved mix design, weighing and measuring devices, proportioning and mixing of materials, water and cement content of each batch, general operation of the plant, and transportation of concrete to jobsite. Inspector shall verify that the amount of free surface moisture contained in fine and course aggregate has been properly accounted for in the concrete mixing to achieve required consistency and water cement ratio.

O. Testing laboratory shall monitor addition of water to concrete at the jobsite and the length of time concrete is allowed to remain in the truck before placement. Inspector shall compare mixture with criteria on the approved mix design and report any significant deviation to Architect, Contractor, and concrete supplier. Do not permit addition of water that will exceed maximum water/cement ratio for the mix as given on the approved mix design.

P. Observe placing of concrete except nonstructural slabs on grade and site Work. Observe and report on placing method, consolidation, cold joints, length of drop, and displacement of

reinforcement. Report deficiencies to Contractor immediately for corrective action. Inspections may be reduced to a periodic basis when all procedures have been deemed satisfactory by the laboratory.

Q. Test reports shall include but not be limited to the following information:
1. Date of concrete placement.
2. Concrete mix identification number or proportion of ingredients.
3. Truck ticket number.
4. Time test was made.
5. Time of batching.
6. Location of each placement.
7. Slump, unit weight, water content (microwave test), and air content of concrete sampled.
8. Date and results of strength test.

R. Report promptly to Architect all details of reasons for rejection of any and all quantities of concrete. Give all information concerning locations of the concrete pours, quantities, date of pours, and other pertinent facts concerning concrete represented by the specimens.

S. Testing laboratory shall certify each delivery ticket indicating class of concrete delivered (or placed), amount of water added and time at which cement and aggregate were dispensed into the truck, and time at which concrete was discharged from the truck.

T. Evaluation and Acceptance:
1. If measured slump or air content of air entrained concrete falls outside specified limits, a check test shall be made immediately on another portion of the same sample. In the event of a second failure, concrete shall be considered to have failed to meet the requirements of the Specifications, and shall not be used in the structure.
2. Strength level of concrete will be considered satisfactory if the averages of sets of three (3) consecutive strength test results are equal to, or exceed, specified strength and no individual test result (average of two [2] cylinders) is below specified strength by more than 500 psi.
3. Completed concrete work will be accepted when requirements of ACI 301 Chapter 18 *Specifications for Structural Concrete for Buildings* have been met.

U. Concrete Test Reports:
1. Reports shall be made and distributed immediately after respective tests or inspections are made:
   a. Where reports indicate deviations from Contract Documents, they shall also include a determination of the probable cause of deviation and where applicable, a recommendation for corrective action.

V. Furnish a statistical analysis for each class of concrete placed on the Project in accordance with ACI 214 and ACI 318. Information shall be updated and distributed once a month as directed by the Architect. Information shall include, but not be limited to, the following:
1. Strength tests at seven (7) days.
2. Strength tests at 28 days of two (2) cylinder averages.
3. 28-day moving average strength tests of last three (3) test groups.
4. Standard deviation and coefficient of variation based on 28-day strength tests.
5. Average strength and number of 28-day tests for most recent month.
6. Strength test one (1) cylinder at 56 days in the event the 28-day strength tests do not meet strength requirements.

W. Test Footings (Shafts; Piers; Caissons): Same diameter and type specified for footings, placed in same manner. Accepted test footings may be used in the Work.

X. Noncompliant Test Reports: Fax test reports indicating noncompliance immediately to each party on the test report distribution list. Copies shall be on different colored paper.

Y. Inspect application of curing compound and monitor curing conditions to assure compliance with Specification requirements. Report curing deficiencies to Contractor immediately and submit a written report to Architect.

3.9 TESTING OF NONSHRINK GROUT

A. Make one (1) strength test for all plates grouted and for all grout used in joints between members.

B. Each test shall consist of four (4) cubes, two (2) tested at seven (7) days and two (2) at 28 days, made and tested in accordance with ASTM C109, with the exception that grout shall be restrained from expansion by a top plate.

3.10 STRUCTURAL STEEL

A. Inspect structural steel during and after erection for compliance with Contract Documents and shop drawings. Review and report on fabricator's quality control procedures and capabilities.

B. Field Inspection:
1. Proper erection of pieces.
2. Proper touch up painting of shop primed structural steel exposed to view or in crawl space.
3. Proper installation of bolts.
4. Plumbness of structure and proper bracing.
5. Proper field painting.
6. Initial inspection of welding process and periodically thereafter as necessary.
7. Visual examination of completed welds.
8. Ultrasonic testing of penetration field welds.
9. Installation of field welded shear studs.
10. Inspect shop fabricated members, upon arrival at the site, for defects incurred during transit and handling.
11. Measure and record camber of beams upon arrival and before erection for compliance with specified camber. Measure lying flat with web horizontal. Return members outside specified camber tolerance to shop for correction.

C. Qualifications of Welders: Fabricator and erector shall provide the testing laboratory with names of welders employed on Work, along with certification that each welder has passed qualification tests within the past 12 months, using procedures covered in AWS D1.1 *Structural Welding Code - Steel*. Verify welder qualifications.

D. Inspection of Field Welding shall Include:
1. Visually inspect fillet welds for size, soundness, and proper return around ends. Inspect seams, folds, and delaminations.
2. Visually inspect welds for proper repair of painting.
3. Ultrasonically test penetration welds in accordance with ASTM E164.
4. Inspect surfaces to be welded. Note surface preparations, fit up, and cleanliness of surface. Verify electrodes for size, type, and condition.
5. Welding inspector shall be present during alignment and fit up of members being welded, and shall verify for correct surface preparation of root openings, sound weld metal, and proper penetration in the root pass. Where weld has not penetrated completely, inspector shall order the joint to be chipped down to sound metal, or

gouged out, and rewelded. Thoroughly inspect root passes for cracks. Gouge out cracks and rewelded to two inches (2”) beyond each end of crack.

6. Inspector shall verify that welds have been marked with welder’s symbol and shall mark welds requiring repairs and re-inspection. Inspector shall maintain a written record of welds. Work completed and inspected shall receive an identification mark by the inspector. Identify unacceptable material and Work identified by word *reject* or *repair* marked directly on the material.
7. Testing agency shall advise the Owner and Architect of any shop and/or field conditions that may require further tests and examination by means other than those specified. Additional tests and examinations shall be performed as authorized by the Owner and Architect.
8. Owner reserves the right to use ultrasonic or radiographic inspection to verify adequacy of welds. Testing procedures and acceptance criteria shall be as specified in AWS D1.1.
9. Weld quality to comply with the American Institute of Steel Construction (AISC) Manual of Steel Construction.
10. Determine percentage of weld tested by the number of welds that fail the initial testing.
11. Reweld and retest welds that fail until the welds pass. Test two (2) additional welds for every weld failure.

E. Inspect bolted construction in accordance with AISC *Specification for Structural Steel Buildings*:
   1. Visually inspect bolts ensuring that plies have been brought into snug contact.
   2. Inspect high strength bolt in accordance with Section 9 of the *Specifications for Structural Joints Using ASTM A325 Bolts*.

F. Inspect stud welding in accordance with AWS D1.1 *Structural Welding Code*:
   1. Weld at least two (2) shear studs at the start of each production period to determine correct generator, control unit, and stud welder setting. The studs shall be capable of being bent 45 degrees from vertical without weld failure.
   2. When the temperature is below 32 degrees F, test one (1) stud in each 100 after cooling. Do not weld studs at temperatures below zero (0) degrees F or when surface is wet with rain or snow. If stud fails in the weld, two (2) new studs shall pass the test before resumption of welding.
   3. Visually inspect studs for compliance with the requirements of the Contract Documents. Verify number, spacing, and weld quality. If, after welding, visual inspection reveals that a sound weld or a full 360-degree fillet has not been obtained for a particular stud, that stud shall be struck with a hammer and bent 15 degrees off perpendicular in the direction away from the missing weld. Studs failing test shall be replaced.

3.11 REINFORCING STEEL MECHANICAL SPLICES

A. Inspection and Observation Services:
   1. Visually inspect and report on completed condition of each mechanical splice of reinforcing steel.
   2. Visually inspect each mechanical splice to ensure compliance with the ICC-ES Reports and the manufacturer's published criteria for acceptable completed splices.
   3. Place special emphasis on the inspection of the end preparation of each bar to be spliced required by the ICC-ES Report.

B. Reports:
   1. Submit reports to Architect:
      a. Copies of manufacturer's published criteria for acceptable completed splices prior to observing mechanical splices.
      b. Reports on each mechanical splice shall indicate location of the splice, size of bars

spliced, and acceptability or rejection of splice. Indicate reasons for rejection on each report.

3.12 OPEN WEB JOISTS AND JOIST GIRDERS

A. Inspect joists at jobsite for compliance with specified fabrication requirements. Verify welded connections between web and chord, splices, and straightness of members.

B. Inspect installation of joists at jobsite. Check connections to supporting members, chord extensions, number of rows of bridging, and bridging connections for compliance with Contract Documents and referenced standards.

C. Verify welder qualification certificates for both shop and field welding operators.

3.13 METAL FLOOR DECK

A. Field inspection shall consist of:
   1. Verifying types, gauges, and finishes for compliance with Contract Documents and shop drawings.
   2. Examine composite floor deck exposed to crawl space for damage to galvanizing due to welding or construction activities. Repair galvanized composite floor deck in accordance with the Specifications.
   3. Examine the erection of metal deck, fastenings, reinforcing of holes, deck reinforcing, miscellaneous deck supports, hanger tabs, shear studs, deck closures, painting, or other coating.
   4. Certification of welders.
   5. Inspect and test field welded shear studs used to fasten metal floor decking to supporting steel as specified for structural steel.

3.14 METAL ROOF DECK

A. Field inspection shall consist of:
   1. Verify types, gauges, and finishes for compliance with Contract Documents and shop drawings.
   2. Examine the erection of the metal deck, including fastenings at supports and side laps, reinforcing of holes, and miscellaneous deck supports.
   3. Certification of welders.
   4. Visual inspection of at least 25 percent of welds.

3.15 SPRAYED FIREPROOFING

A. Verify that applied thickness, density, and bond strength of sprayed fireproofing meets fire rating requirements of approved design.

B. Verify that installation complies with fire rating requirements of approved design.

C. Inspect and test for thickness:
   1. Test 25 percent of structural frame columns and beams in each building level.
   2. Test ten percent (10%) of beams other than structural frame in each building level.
   3. Test one (1) slab per 5,000 square feet of building area.

D. Inspect and test in accordance procedures of ASTM E605 and ASTM E736.

3.16 EXPANSION BOLT INSTALLATION

A. Inspect drilling of each hole and installation of each expansion bolt for compliance with Contract Documents and shop drawings.

B. Verify installation torque for each expansion bolt for compliance with manufacturer's installation instructions.

3.17 LIGHTWEIGHT INSULATING CONCRETE FILL

A. Inspection and Observation Services (As Required):
   1. Inspection of roof deck prior to start of Work.
   2. Inspection during installation of insulation and lightweight insulating concrete fill Work to ascertain compliance with Contract Documents.
   3. Observation of base ply fastener pull tests performed by Contractor to ascertain minimum withdrawal resistance of 40 pounds per fastener.

B. Testing Services (As Required):
   1. References (as applicable for tests required):
      a. American Society for Testing and Materials (ASTM):
         1) C177 - Standard Test Method for Steady State Heat Flux Measurements and Thermal Transmission Properties By Means of the Guarded Hot Plate Apparatus.
         2) C495 - Test Method for Compressive Strength of Lightweight Insulating Concrete.
         3) C578 - Specification for Rigid, Cellular Polystyrene Thermal Insulation.
   2. Test EPS insulation board for thermal insulation value in accordance with ASTM C177.
   3. Test lightweight insulating concrete fill in accordance with ASTM C495 for:
      a. Mix design compressive strength.
      b. Mix design wet and dry density range.
      c. Number of Tests:
         1) One (1) per 5,000 square feet.
         2) Not less than one (1) for each day's Work.
   4. Test EPS insulation board for density in accordance with ASTM C578.

3.18 TESTING OF ROOFING

A. Inspection and Observation Services (As Required):
   1. Inspection of roof deck prior to start of Work.
   2. Inspect onsite condition of stored roofing materials.
   3. Inspection during roofing, roof insulation, and sheet metal Work to ascertain compliance with Contract Documents.
   4. Observation of roof test cuts performed by Contractor to ascertain that they are properly made.
   5. Observation of patching of roof test cuts to ascertain that they are properly made.

B. Testing Services (As Required):
   1. Perform dissection and analysis on cuts provided by Contractor to confirm number of plies, bonding of plies, weight of bitumen and softening temperature to ascertain compliance with Specifications.

3.19 MASONRY

A. Inspection and Observation Services:
   1. Inspection of placement of reinforcement including condition, grade, size, location, spacing, and lap splices.
   2. Review mortar design mixes.

3. Inspection of laying, mortaring, and grouting of concrete masonry units and elements.

B. Testing Services:
1. References (as applicable for tests required):
   a. ASTM International (ASTM):
      1) C140 - Standard Test Methods of Sampling and Testing Concrete Masonry Units.
      2) C780 - Standard Test Method for Preconstruction and Construction Evaluation of Mortars for Plain and Reinforced Unit Masonry.
      3) C1019 - Standard Test Method for Sampling and Testing Grout.
2. Testing of Concrete Masonry Units (CMU):
   a. Pre-construction - Perform the following tests in accordance with ASTM C140:
      1) Compressive Strength.
      2) Absorption.
      3) Weight.
      4) Moisture Content.
      5) Dimensions.
3. Mortar Tests:
   a. Pre-construction - Perform the following tests in accordance with ASTM C780 on each type of mortar mix used on the Project:
      1) 28-day compressive strength.
      2) Water retention.
   b. Construction: Perform 28-day compressive strength test in accordance with ASTM C780 on each type of mortar mix used on the Project at the rate of one (1) test per 2,000 square feet of masonry.
4. Refer to and include Work for reinforcing steel specified.
5. Grout tests:
   a. Pre-construction - Perform the following tests in accordance with ASTM C1019 on each type of grout mix used on the Project:
      1) Slump test.
      2) 28-Day compressive strength.
   b. Construction: Perform 28-day compressive strength test in accordance with ASTM C1019 on each type of grout mix used on the Project at the rate of one (1) test per 2,000 square feet of masonry.
6. Prism test: Perform pre-construction 28-day compressive strength test on concrete masonry walls.

3.20 REPAIR AND PROTECTION

A. On completion of testing, inspecting, sample taking, and similar services, repair damaged construction and restore substrates and finishes:
1. Provide materials and comply with installation requirements specified in other Specification Sections or matching existing substrates and finishes. Restore patched areas and extend restoration into adjoining areas with durable seams that are as invisible as possible. Comply with the Contract Document requirements for cutting and patching in Section 01 73 29: Cutting and Patching.

B. Protect construction exposed by or for quality control service activities.

C. Repair and protection are Contractor's responsibility regardless of the assignment of responsibility for quality control services.

END OF SECTION 01 45 23

SECTION 01 45 24 IMPORT MATERIALS TESTING

PART 1 GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. This Section specifies the requirements for the sampling, testing, transportation, and certification of imported fill materials to school sites.

B. This Specification defines:
1. Contractor requirements for use of imported materials on Project sites.
2. Contractor requirements for stockpiling materials for use on Project sites.
3. Testing requirements for all materials imported, stockpiled, or generated for use on a Project site.
4. Contractor testing and reporting requirements.
5. Contractor submittal requirements.

C. Objectives:
1. Ensure that fill materials imported to Project sites are safe for students, staff, and visitors.
2. Ensure that representative data be collected so that analytical determinations can be made in regard to the first objective.
3. Require Contractor to contract with and pay for the services of a licensed environmental professional (licensed State of California Professional Engineer (PE Civil), Professional Geologist (PG) or Registered Environmental Assessor II (REA II) familiar with environmental site assessment and waste classification.
4. Require Contractor to contract with and pay for an independent, approved California Department of Health Services certified testing laboratory to perform sampling and testing of imported and site generated fill materials.
5. Require Contractor to pay all fees required by authorities having jurisdiction over area.
6. Require Contractor to post bonds required by authorities having jurisdiction over area.

1.3 SUBMITTALS

A. Contractor shall submit to Owner's Authorized Representative (OAR):
1. A qualifications statement for Contractor's independent California certified testing laboratory and required licensed environmental professional (California Professional Engineer (PE civil), Professional Geologist (PG), or Registered Environmental Assessor II (REA II) prior to the start of Work. Contractor's licensed environmental professional must possess recent demonstrated environmental experience in soil sampling and waste classification:
   a. Testing laboratory must be pre-approved by the Division of State Architect.
2. A draft import Sampling Strategy Plan (SSP) prepared by Contractor's licensed environmental professional for review and concurrence by the OAR. The objective of the SSP is to obtain representative sample data. The draft SSP must be submitted at least 72 hours prior to all proposed import sampling activities:
   a. At a minimum, the draft SSP shall include a site map which shows the location of the proposed import and the location and number of the proposed stockpile samples. The draft SSP shall also contain information pertaining to the total volume of the stockpile proposed for sampling and the rationale in support of the proposed sampling approach. Existing environmental documentation specific to the import site shall be utilized by Contractor's environmental professional to support the proposed sampling approach and analytical method suite. For new Project sites, this information would include a DTSC approved site

investigation report, e.g., Preliminary Environmental Assessment (PEA). It is the responsibility of Contractor to request this information in advance from the OAR if they do not already have access to a copy at the jobsite.

b. Lacking this information or rationale, samples shall be analyzed for all analytical methods described in this Section. Guidance for the minimum number of samples per stockpile volume is provided in Table 1 (supplemental samples may be required by the OAR if pothole stockpile sampling is utilized). In addition, the draft SSP shall contain all necessary contact information for the import site and a proposed schedule for the sampling activities.

c. To expedite the review process, the draft SSP shall be submitted electronically to the OAR in MS Word format.

d. Upon revision of the draft SSP by Contractor's licensed environmental professional and acceptance by the OAR, four (4) revised copies of the final SSP will be provided to the OAR for distribution to OEHS and the Project file.

3. A draft certification/sample data report prepared by Contractor's licensed environmental professional for review and concurrence. At a minimum, the draft certification/sample data report shall contain:
   a. A site map showing the location of the stockpile and stockpile sample locations.
   b. A detailed discussion and evaluation of the laboratory results.
   c. A summary of findings and recommendations that provide a determination on the waste classification of the subject materials, based on the representative sample results.
   d. Recommendations for additional steps, if any.
   e. Chain-of-custody forms and all laboratory data with respective QA/QC sheets.
   f. To expedite the review process, the draft SSP shall be submitted electronically to the OAR in MS Word format.
   g. Upon revision of the draft certification report by Contractor's licensed environmental professional and acceptance by the OAR, three (3) copies of the final report will be submitted to the OAR.
4. The environmental compliance manager shall confirm that the proposed waste classification for the proposed import material is appropriate.
5. Written documentation, in the form of a memo or e-mail from Contractor to OAR, prior to import, verifying that the hauling contract specifies "clean" trucks and that the actual haul trucks utilized for import activities will be clean of visible contamination or deleterious materials.
6. Written documentation that the trucks went directly from the source location to the recipient location with no detours or stops at other locations and that short loads were not augmented by other materials that were not tested as part of the final import SSP. It is Contractor's responsibility to document that no other trips or short-load augmentation occurred and submit to the documentation within five (5) business days of the completion of the import activities. All import transportation activities shall be conducted in accordance with all applicable (local, State, and Federal) rules and regulations.
7. The independent approved testing laboratory shall perform the required tests and report results of all tests noting if the tested material passed or failed such tests and shall furnish copies to the IOR, Architect, OAR, Contractor, and others as required. Report shall state tests were conducted under the responsible charge of a licensed State of California professional engineer and the material was tested in accordance with applicable provisions of the Contract Documents, Title 24, CCR.
8. Certification, in the form of haul tickets or completed waste manifests, documenting the volume and recipient of all import materials and activities. This documentation shall be coordinated through the OAR environmental compliance manager:
   a. For approved import to new Project sites, unregulated facilities (landfill) or non-Project sites, haul tickets may be utilized, but shall contain the following minimum information:
      1) Date of haul activity.
      2) Address of source.
      3) Address of recipient.
      4) Load volume.
      5) Time of departure from source.
      6) Time of arrival at recipient site.
      7) Signature of recipient or recipient's agent.

1.4 QUALITY ASSURANCE

A. No import of earth or geotechnical grading or fill materials can occur at the Project site without prior approval by the OAR.

PART 2 PRODUCTS

2.1 MATERIALS

A. Imported:
1. Soils: Soils proposed for import shall be tested pursuant to the requirements of this Section.
2. Gravels: Clean gravel, consisting of native rock from a commercial source, shall be tested pursuant to the requirements of this Section.
3. Sands: Clean sand from a commercial source shall be tested pursuant to the requirements of this Section. Contractor shall provide written documentation, which identifies the source, volume, and proposed transport date(s) of the material for review.
4. Miscellaneous material: No miscellaneous material containing crushed concrete, asphalt, construction debris, or other potential deleterious materials may be utilized or imported to the Project site for use as fill or grading material.

B. Import of Fill Materials:
1. Fees: Contractor shall pay as required by authorities having jurisdiction over area.
2. Bonds: Contractor shall post as required by authorities having jurisdiction over area.

PART 3 EXECUTION

3.1 GRADING/EXCAVATION

A. If Contractor encounters an area(s) with discolored, stained, and/or odorous soils or any other evidence of contamination during excavation/grading work, Contractor must immediately notify District Representative, cease work in the aforementioned area(s), and secure the area(s) with fencing, tape, stakes, or other suitable means to prevent entry by personnel or equipment. In turn, the District Representative will initiate a construction response to address the contamination, in accordance with pertinent regulatory requirements.

3.2 SAMPLING AND TESTING

A. Contractor shall contract with, and pay for, the services of a licensed environmental professional (licensed State of California Professional Engineer (PE Civil), Professional Geologist (PG), or Registered Environmental Assessor II (REA II).

B. Contractor shall contract with, and pay for, an independent, approved California Department of Health Services certified testing laboratory to perform sampling and testing of imported, exported, and site generated fill materials:
1. Note: Utilization of portable, onsite crushing equipment on the Project site also requires prior notification and approval by the OAR.

C. All imported fill/grading material, unless otherwise specified in writing by the OAR, must be tested at the site of origin. Import testing and certification process shall include the following steps:
1. Stockpile all materials for sampling (standard stockpile or backhoe pothole stockpile). Crushed fill materials generated by Contractor at a Project site must be segregated by material (e.g., separate stockpiles for concrete, asphalt, etc.).
2. Submit draft SSP for review and concurrence by OAR.
3. Collect and analyze samples (see Table 1 for number of samples per volume) per SSP. Once fill materials for export have been stockpiled and tested, they may not be used onsite for any purpose without prior approval by OAR.

4. Submit draft import sample data report for review and concurrence by OAR.
5. Submit final import sample data report (certification report) to OAR's environmental compliance manager for concurrence of proposed waste classification.
6. Submit required pre-import documentation/record to the OAR (e-mail).
7. Submit post import certifications to the OAR.
8. In addition to the preceding, requirements, certifications, and submittals as indicated in previous subsections above.

D. Owner retains the right to refuse any fill material proposed for use at a Project site.

E. Import fill materials shall be stockpiled by Contractor and are deemed acceptable for import or reuse only when it is demonstrated to the satisfaction of the OAR's environmental compliance manager that the subject materials meet the requirements of this Section.

F. As described in this Section, lacking site-specific data or sample rationale to support a more focused analytical approach, Contractor shall analyze all samples for the following substances according to the methods indicated below. Table 3 is a waste classification flowchart for use by Contractor's environmental professional. In all cases, detection levels and quality assurance/quality control methods shall be in accordance with standard Method reporting limits and best laboratory practices and the following USEPA (EPA) methods:
1. Total Petroleum Hydrocarbons, utilizing EPA Method 8015M, for gasoline and diesel.
2. Volatile Organic Compounds, utilizing EPA Method 8260B/5035.
3. Polychlorinated biphenyls, utilizing EPA Method 8082.
4. Semi-Volatile Compounds, utilizing EPA Method 8270C.
5. Organochlorine Pesticides, utilizing EPA Method 8081A.
6. Organophosphorous Pesticides, utilizing EPA Method 8141A.
7. Chlorinated Herbicides, utilizing EPA Method 8151A.
8. California Code of Regulations Title 22 (CAM 17) Metals, utilizing EPA Method 6010B/7470A.
9. Hexavalent Chromium, utilizing EPA Method 7199.
10. Arsenic/Thallium, utilizing EPA Method 6020.

G. Import fill material may be deemed defective for use by the OAR at the Project site if any of the following results are obtained:
1. Total petroleum hydrocarbons are present at concentrations exceeding 100 milligrams per kilogram (mg/kg) for gasoline and 1,000 mg/kg for oil/diesel and long chain hydrocarbons.
2. Solvents and other volatile organic compounds are present at concentrations exceeding the laboratory reporting limit.
3. Polychlorinated biphenyls are present at concentrations exceeding the laboratory reporting limit.
4. Semi-volatile compounds are present at concentrations exceeding the laboratory reporting limit.
5. Organochlorine pesticides are present at concentrations exceeding the laboratory reporting limit.
6. Organophosphorous pesticides are present at concentrations exceeding the laboratory reporting limit.
7. Chlorinated herbicides are present at concentrations exceeding the laboratory reporting limit.
8. California Code of Regulations Title 22 (CAM 17) Metals at concentrations exceeding site-specific background.
9. Hexavalent chromium is present at concentrations exceeding 15 mg/kg.

H. In addition to screening for hazardous materials, the imported soil must be tested and certified to be free of:
1. Organics and debris.
2. Infestation by vermin or insects, in particular fire ants.
3. Boron.

I. Imported materials must be suitable for engineered fill, even if used at landscaping, free from large rocks.

J. Imported materials shall not have a high clay content and must meet the permeability requirements of

the Project's hardscape if there is such requirement.

K. Evaluate concentrations of metals in import fill by conducting the analysis set forth below:
   1. Compare the maximum detected metal concentrations in import fill samples to the Threshold Criteria listed in Table 4. If any metal concentration exceeds its listed background value, the fill material fails and shall be deemed defective and unacceptable for use at the Project site unless supported by a site-specific health risk assessment.
   2. In addition to otherwise specified in this Section, import fill shall be deemed environmentally defective and unacceptable for use if any of the following results are obtained:
      a. Arsenic concentrations exceed 12.0 mg/kg.
      b. Lead concentration exceeds 255 mg/kg or fails TTLC/STLC.
      c. Import materials at new Project sites with total chromium concentrations greater than or equal to 100 mg/kg shall be tested for hexavalent chromium.

L. All import fill material shall be characterized, handled, and documented in accordance with applicable US EPA and State of California hazardous waste and hazardous materials regulations. For the purpose of this Specification, "contaminated" shall mean any soil or geotechnical material at a concentration that would require disposal at a regulated facility (i.e., California hazardous or RCRA hazardous). OAR must be notified at least 72 hours prior to the disposal of any hazardous waste or hazardous material. No material disposal or reuse can take place without prior written approval of the OAR.

M. Specification test results and OAR approvals shall be valid for a period of 120 days from the date of the subject testing unless a variance is requested by Contractor and approved by OAR. Previously approved materials shall not be utilized or disposed off-site after the 120-day limit without prior review and approval by the OAR.

N. Requests for variances to this Specification shall be submitted in writing to the OAR a minimum of two (2) weeks in advance of need for review and approval. The request for variance must provide all available testing data, a rationale to support the request and have an active funding line (provided by OAR) to facilitate review by the OAR. OAR will review the request for variance and will provide its preliminary determination within two weeks. Certain requests may require final approval by the Department of Toxic Substances Control (DTSC).

O. Soils with concentrations above screening levels may, upon prior approval by the OAR, be reused at other Project sites if supported by a site-specific human health risk assessment.

P. Details of the samples and testing must be submitted to and approved by the OAR's environmental compliance manager before transportation.

Q. Haul Routes and Regulations/Restrictions: Contractor must comply with requirements of Project EIR (CEQA) and authorities having jurisdiction over the Project area and the proposed activities (e.g. Regional Water Quality Control Board, Department of Toxic Substances Control, etc.).

3.3 TRANSPORTATION

A. Contractor shall pay all fees required by authorities having jurisdiction over area.

B. Contractor shall pay all fees for disposal and/or processing of contaminated and/or hazardous fill materials at a regulated facility.

C. Contractor shall post and pay for all bonds required by authorities having jurisdiction over area.

SECTION CONTINUES ON NEXT PAGE

TABLE 1: MINIMUM SAMPLING FREQUENCY	
Volume (Cubic Yards)	Sampling Frequency
0 – 1,000	1 per 250 CY
1,001 - 5,000	4 samples per first 1,000 CY and 1 sample per each additional 500 CY
Greater then 5,000	12 samples for first 5000 CY and 1 sample per each additional 1,000 CY

Chemicals of Potential Concern	TABLE 2 WASTE CHARACTERIZATION				
	Hazardous Waste if Exceed Criteria - TTLC Level* (mg/kg)	Additional WET Leaching Tests if Exceed Hazardous Waste Criteria - 10 times STLC Level** (mg/kg)	California-Regulated Hazardous Waste - Soluble Threshold Limit Concentration -STLC Level (mg/l)	Additional TCLP Leaching Tests if Exceed Hazardous Waste Criteria - 20 times TCLP Level** (mg/kg)	Federally-Regulated (RCRA) Hazardous Waste - Toxicity Characteristic Leaching Procedure - TCLP Level (mg/l)
CAM 17 Metals					
Antimony	500	150	15	NA	NA
Arsenic	500	50	5	100	5
Barium	10,000	1,000	100	2,000	100
Beryllium	75	7.5	0.75	NA	NA
Cadmium	100	10	1	20	1
Chromium	2,500	50	5	100	5
Cobalt	8,000	800	80	NA	NA
Copper	2,500	250	25	NA	NA
Lead	1,000	50	5	100	5
Mercury	20	2	0.2	4	0.2
Molybdenum	3,500	3,500	350	NA	NA
Nickel	2,000	200	20	NA	NA
Selenium	100	10	1	20	1
Silver	500	50	5	100	5
Thallium	700	70	7	NA	NA
Vanadium	2,400	240	24	NA	NA
Zinc	5,000	2,500	250	NA	NA
Chromium (VI)	500	50	5	NA	NA

TABLE 3 – WASTE CLASSIFICATION FLOWCHART

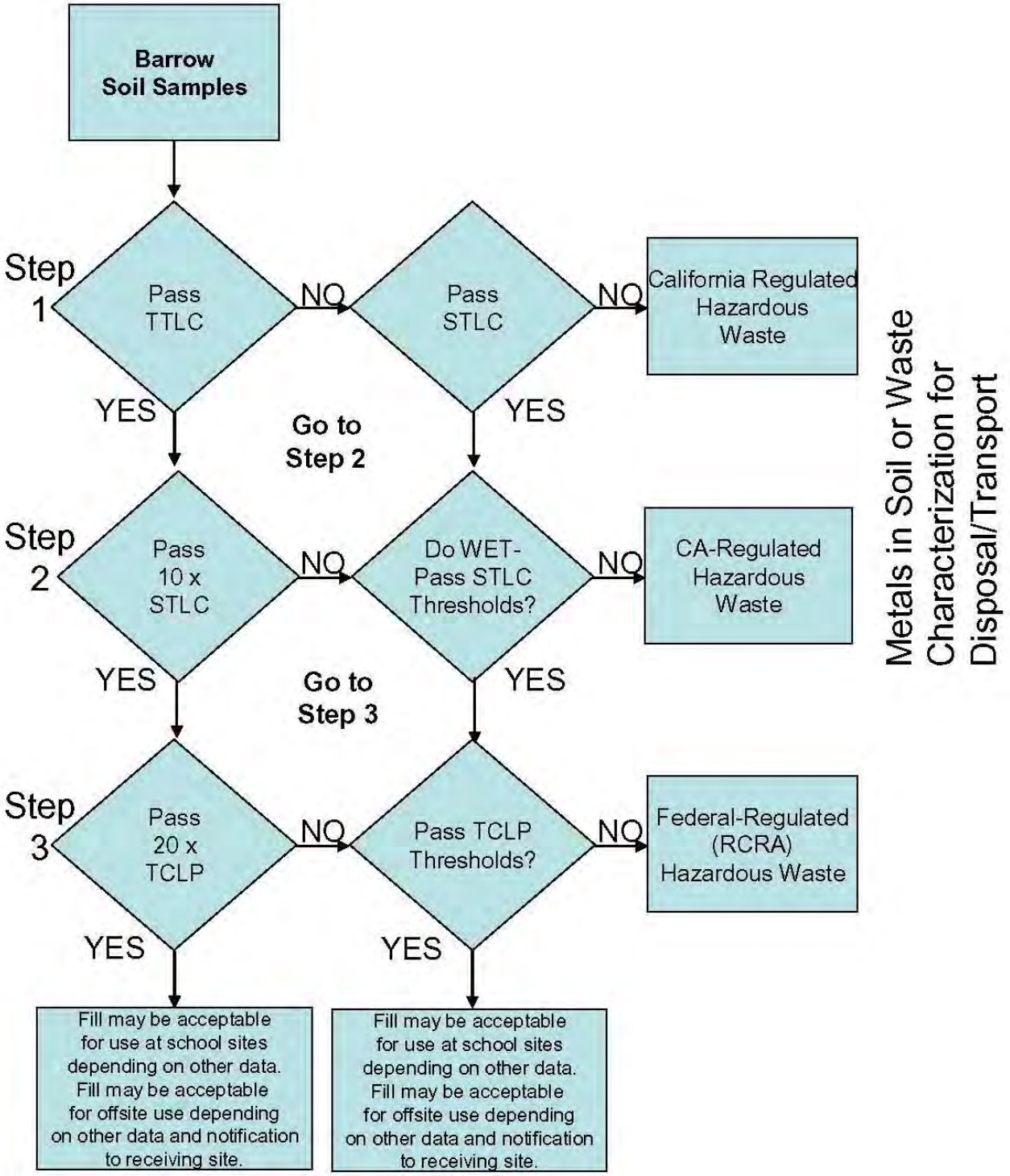


TABLE 4: THRESHOLD CRITERIA FOR METALS IN SOIL - LOOK UP VALUES

CAM 17 Metals	Soil Threshold Criteria (mg/kg)	Basis
Antimony	28	NC
Arsenic	11.3	BK
Barium	2330	NC
Beryllium	16	C
Cadmium	1.4	C
Chromium	106656	NC
Cobalt	4266	NC
Copper	2631	NC
Lead	255	PbB
Mercury	21	NC
Molybdenum	356	NC
Nickel	148	C
Selenium	356	NC
Silver	356	NC
Thallium	4.7	NC
Vanadium	498	NC
Zinc	21331	NC

NC = Non-Cancer Health Effects

BK = Background

C = Cancer Risk

PbB = Blood Lead Levels

END OF SECTION 01 45 24

SECTION 01 50 00 TEMPORARY FACILITIES AND CONTROLS

PART 1 GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section includes requirements for temporary utilities, support facilities, and security and protection facilities, including but not limited to:
1. Water service and distribution.
2. Sanitary facilities, including toilets, wash facilities, and drinking water facilities.
3. Heating and cooling facilities.
4. Ventilation.
5. Electric power service.
6. Lighting.
7. Telephone service (land line)
8. Waste disposal facilities.
9. Field office.
10. Storage and fabrication sheds.
11. Lifts and hoists.
12. Construction aids and miscellaneous services and facilities.
13. Environmental protection.
14. Pest control.
15. Enclosure fence.
16. Security enclosure and lockup.
17. Barricades, warning signs, and lights.
18. Temporary partitions.
19. Fire protection.
20. Accessories necessary for a complete installation.
21. Temporary signage.

B. Use Charges:
1. Installation, removal of, and use charges for temporary facilities shall be included in the Contract Sum unless otherwise indicated. Allow other entities to use temporary services and facilities without cost, including, but not limited to, Owner's construction forces, Architect, occupants of the Project, testing agencies, and authorities having jurisdiction.
2. Water and sewer service: Pay sewer service use charges for water used and sewer usage by all entities for construction operations.
3. Electric power service: Pay electric power service use charges for electricity used by all entities for construction operations.

1.3 SUBMITTALS

A. Site Plan: Show temporary facilities, utility hookups, staging areas, and parking areas for construction personnel.

B. Moisture Protection Plan:
1. Describe procedures and controls for protecting materials and construction from water absorption and damage:

a. Describe delivery, handling, and storage provisions for materials subject to water absorption or water damage.
b. Indicate procedures for discarding water damaged materials, protocols for mitigating water intrusion into completed Work, and replacing water damaged work.
c. Indicate sequencing of work that requires water, such as sprayed fire resistive materials, plastering, and tile grinding, and describe plans for dealing with water from these operations. Show procedures for verifying that wet construction has dried sufficiently to permit installation of finish materials.

C. Dust and HVAC Control Plan:
1. Submit coordination drawing and narrative that indicates the dust and HVAC control measures proposed for use, proposed locations, and proposed time frame for their operation. Identify further options if proposed measures are later determined to be inadequate. Include the following:
a. HVAC system isolation schematic drawing.
b. Location of proposed air-filtration system discharge.
c. Waste handling procedures.
d. Other dust control measures.

1.4 QUALITY ASSURANCE

A. Regulatory Requirements:
1. Accessible Temporary Egress:
a. Comply with 2022 California Building Code (CBC) CCR Title 24, Part 2, (as adopted and amended by DSA).
b. Comply with applicable provisions in the U.S. Architectural and Transportation Barriers Compliance Board ADA-ABA Accessibility Guidelines (ADAAG), ICC/ANSI A117.1.

B. Electric Service: Comply with NECA, NEMA, and UL standards and regulations for temporary electric service. Install service to comply with NFPA 70.

C. Tests and Inspections: Arrange for authorities having jurisdiction to test and inspect each temporary utility before use. Obtain required certifications and permits.

PART 2 PRODUCTS

2.1 MATERIALS

A. Provide new materials. Undamaged, previously used materials in serviceable condition may be used if approved by Architect. Provide materials suitable for use intended.

B. Chain Link Fencing: Minimum 2 inches (50 mm), 0.148-inch (3.8 mm) thick, galvanized steel, chain link fabric fencing; minimum 6 feet (1.8 m) high with galvanized steel pipe posts; minimum 2-3/8-inch (60 mm) OD line posts and 2-7/8 inch (73 mm) OD corner and pull posts.

C. Polyethylene Sheet: Reinforced, fire-resistive sheet, ten (10) mils (0.25 mm) minimum thickness, with flame spread rating of 15 or less per ASTM E84.

D. Dust Control Adhesive Surface Walk-off Mats: Provide mats a minimum of 36 inches by 60 inches (914 mm x 1624 mm).

E. Insulation: Unfaced mineral fiber blanket, manufactured from glass, slag wool, or rock wool;

with maximum flame spread and smoke developed indexes of 25 and 50, respectively.

F. Lumber and Plywood: Comply with requirements in Sections 06 10 00: Rough Carpentry or 06 10 53: Miscellaneous Rough Carpentry.

G. Gypsum Board: Minimum 1/2-inch (12.7 mm) thick by 48 inches (1219 mm) wide by maximum available lengths; Type X or Type C panels with tapered edges. Comply with Section 09 21 16: Gypsum Board Assemblies.

H. Paint: Comply with requirements in Section 09 90 00: Painting and Coating.

I. Tarpaulins: Fire resistive labeled with flame-spread rating of 15 or less.

J. Water: Potable.

2.2 TEMPORARY FACILITIES

A. Field Offices, General: Prefabricated or mobile units with serviceable finishes, temperature controls, and foundations adequate for normal loading.

B. Common-Use Field Office: Of sufficient size to accommodate needs of Owner, Architect, and construction personnel office activities and to accommodate Project meetings specified in other Division 01 Sections. Keep office clean and orderly. Furnish and equip offices as follows:
   1. Furniture required for Project site documents including file cabinets, plan tables, plan racks, and bookcases.
   2. Conference room of sufficient size to accommodate meetings of 10 individuals. Provide electrical power service and 120-V ac duplex receptacles, with no fewer than one receptacle on each wall. Furnish room with conference table, chairs, and 4-foot-square tack and marker boards.
   3. Drinking water and private toilet.
   4. Coffee machine and supplies.
   5. Heating and cooling equipment necessary to maintain a uniform indoor temperature of 68 to 72 deg F
   6. Lighting fixtures capable of maintaining average illumination of 20 fc (215 lx) at desk height.

C. Storage and Fabrication Sheds: Provide sheds sized, furnished, and equipped to accommodate materials and equipment for construction operations. Store combustible materials apart from building.

2.3 EQUIPMENT

A. Fire Extinguishers: Portable, UL rated; with class and extinguishing agent as required by locations and classes of fire exposures.

B. Drinking Water: Containerized, tap dispenser, bottled water drinking water units, including paper cup supply. Where power is accessible, provide electric water coolers to maintain dispensed water temperature at 45 degrees F to 55 degrees F (7.2 degrees C to 12.7 degrees C).

C. Electrical Outlets: Properly configured, NEMA polarized outlets to prevent insertion of 110V to 120V plugs into higher voltage outlets; equipped with ground-fault circuit interrupters, reset button, and pilot light.

D. Power Distribution System Circuits: Where permitted and overhead and exposed for surveillance, wiring circuits, not exceeding 125-V ac, 20-A rating, and lighting circuits may be nonmetallic sheathed cable.

E. HVAC Equipment:
   1. Unless Owner authorizes use of permanent HVAC system, provide vented, self-contained, liquid propane gas or fuel oil heaters with individual space thermostatic control:
      a. Heating units: Listed and labeled for type of fuel being consumed by a qualified testing agency acceptable to authorities having jurisdiction and marked for intended location and application.
      b. Permanent HVAC system: If Owner authorizes use of permanent HVAC system for temporary use during construction, provide filter with MERV of 8 at each return air grille in system and remove at end of construction. Clean HVAC system as required in Section 01 77 00: Closeout Procedures and install new filter with MERV 11 or greater.

F. Air Filtration Units: Primary and secondary HEPA filter equipped portable units with four-stage filtration. Provide single switch for emergency shutoff. Configure to run continuously.

PART 3 EXECUTION

3.1 PROJECT CONDITIONS

A. Temporary Use of Permanent Facilities: Engage installer of each permanent service to assume responsibility for operation, maintenance, and protection of each permanent service during its use as a construction facility before Owner's acceptance, regardless of previously assigned responsibilities.

3.2 INSTALLATION

A. Locate facilities where they will serve the Project adequately and result in minimum interference with performance of the Work. Relocate and modify facilities as required by progress of the Work:
   1. Locate facilities to limit site disturbance as specified in Section 01 10 00: Summary.

B. Provide each facility ready for use when needed to avoid delay. Do not remove until facilities are no longer needed or are replaced by authorized use of completed permanent facilities.

3.3 TEMPORARY UTILITY INSTALLATION

A. Install temporary service. Arrange with utility company, Owner, and existing users for time when service can be interrupted, if necessary, to make connections for temporary services.

B. Sewers and Drainage:
   1. Provide temporary utilities to remove effluent lawfully:
      a. Connect temporary sewers to municipal system as directed by authorities having jurisdiction.

C. Water Service: Install water service and distribution piping in sizes and pressures adequate for construction.

D. Sanitary Facilities:
   1. Provide temporary toilets, wash facilities, and drinking water for use of construction personnel. Comply with requirements of authorities having jurisdiction for type,

number, location, operation, and maintenance of fixtures and facilities:

a. Disposable supplies: Provide toilet tissue, paper towels, paper cups, and similar disposable materials for each facility. Maintain adequate supply. Provide covered waste containers for disposal of used material.
b. Wash facilities: Install wash facilities supplied with potable water at convenient locations for personnel who handle materials that require wash up. Dispose of drainage properly. Supply cleaning compounds appropriate for each type of material handled. Provide safety showers, eyewash fountains, and similar facilities for convenience, safety, and sanitation of personnel.

E. Heating and Cooling: Provide temporary heating and cooling required by construction activities for curing or drying of completed installations or for protecting installed construction from adverse effects of low temperatures or high humidity. Select equipment that will not have a harmful effect on completed installations or elements being installed.

F. Isolation of Work Areas in Occupied Facilities:

1. Prevent dust, fumes, and odors from entering occupied areas:
   a. Prior to commencing Work, isolate the HVAC system in area where Work is to be performed according to coordination drawings:
      1) Disconnect supply and return ductwork in Work area from HVAC systems servicing occupied areas.
      2) Maintain negative air pressure within Work area using HEPA equipped air filtration units, starting with commencement of temporary partition construction and continuing until removal of temporary partitions is complete.
   b. Maintain dust partitions during the Work. Use vacuum collection attachments on dust producing equipment. Isolate limited Work within occupied areas using portable dust containment devices.
   c. Perform daily construction cleanup and final cleanup using approved, HEPA filter equipped vacuum equipment.

G. Ventilation and Humidity Control:

1. Provide temporary ventilation required by construction activities for curing or drying of completed installations or for protecting installed construction from adverse effects of high humidity. Select equipment that will not have a harmful effect on completed installations or elements being installed. Coordinate ventilation requirements to produce ambient condition required and minimize energy consumption:
   a. Provide dehumidification systems when required to reduce substrate moisture levels to level required to allow installation or application of finishes.

H. Electric Power Service:

1. Provide electric power service and distribution system of sufficient size, capacity, and power characteristics required for construction operations. Install electric power service underground unless otherwise indicated:
   a. Electric distribution - Provide receptacle outlets adequate for connection of power tools and equipment:
      1) Provide waterproof connectors to connect separate lengths of electrical power cords if single lengths will not reach areas where construction activities are in progress. Do not exceed safe length voltage ratio.
      2) Provide warning signs at power outlets other than 110 to 120-V.
      3) Provide metal conduit, tubing, or metallic cable for wiring exposed to possible damage. Provide rigid steel conduits for wiring exposed on grades, floors, decks, or traffic areas.
      4) Provide metal conduit enclosures or boxes for wiring devices.
      5) Provide four (4) gang outlets, spaced so 100-foot (30 m) extension cord can reach each area for power hand tools and task lighting. Provide a separate 125-V ac, 20-A circuit for each outlet.

I. Lighting:
   1. Provide temporary lighting with local switching that provides adequate illumination for construction operations, observations, inspections, and traffic conditions:
      a. Install and operate temporary lighting that fulfills security and protection requirements without operating entire system.
      b. Install lighting for Project identification sign.

J. Telephone Service:
   1. Provide temporary telephone service in common use facilities for use by construction personnel, Architect, and inspection services. Install a minimum of one (1) telephone line(s) for each field office:
      a. Provide dedicated telephone line for each facsimile machine in each field office.
      b. At each telephone, post a list of important telephone numbers:
         1) Police and fire departments.
         2) Ambulance service.
         3) Contractor's home office.
         4) Contractor's emergency after-hours telephone number.
         5) Architect's office.
         6) Engineers' offices.
         7) Owner's office.
         8) Principal subcontractors' field and home offices.
      c. Provide superintendent with cellular telephone or portable two-way radio for use when away from field office.

K. Electronic Communication Service:
   1. Provide a desktop computer and printer/scanner in the primary field office adequate for use by Architect, inspection services, and Owner to access Project electronic documents and maintain electronic communications:
      a. Internet service: Broadband modem, router, and ISP equipped with hardware firewall.
      b. Internet security: Integrated software, providing software firewall, virus, spyware, phishing, and spam protection in a combined application.
      c. Backup: External hard drive, minimum one (1) terabyte, with automated backup software providing daily backups.

3.4 SUPPORT FACILITIES INSTALLATION

A. Provide construction for temporary offices, shops, and sheds located within construction area or within 30 feet (9 m) of building lines that is noncombustible according to ASTM E136. Comply with NFPA 241:
   1. Maintain support facilities until Architect schedules Substantial Completion inspection. Remove before Substantial Completion. Personnel remaining after Substantial Completion will be permitted to use permanent facilities under conditions acceptable to Owner.

B. Temporary Use of Permanent Roads and Paved Areas:
   1. Locate temporary roads and paved areas in same location as permanent roads and paved areas. Construct and maintain temporary roads and paved areas adequate for construction operations. Extend temporary roads and paved areas, within construction limits indicated, as necessary for construction operations:
      a. Coordinate elevations of temporary roads and paved areas with permanent roads and paved areas.
      b. Prepare subgrade and install sub-base and base for temporary roads and paved areas.
      c. Recondition base after temporary use, including removing contaminated material, regrading, proof rolling, compacting, and testing.

d. Delay installation of final course of permanent pavement until immediately before Substantial Completion.

C. Traffic Controls:
1. Comply with requirements of authorities having jurisdiction:
a. Protect existing site improvements to remain including curbs, pavement, and utilities.
b. Maintain access for fire-fighting equipment and access to fire hydrants.

D. Parking: Provide temporary parking areas for construction personnel.

E. Dewatering Facilities and Drains:
1. Comply with requirements of authorities having jurisdiction. Maintain Project site, excavations, and construction free of water:
a. Dispose of rainwater in a lawful manner that will not result in flooding the Project or adjoining properties, or endanger permanent Work or temporary facilities.

F. Project Signs: Not listed in 3.5 Below.
1. Provide Project signs as indicated. Unauthorized signs are not permitted:
a. Identification signs: Provide Project identification signs as indicated on Drawings.
b. Temporary signs:
1) Provide other signs as indicated and as required to inform public and individuals seeking entrance to the Project:
a) Provide temporary, directional signs for construction personnel and visitors.
c. Maintain and touchup signs so they are legible at all times.

G. Waste Disposal Facilities: Provide waste collection containers in sizes adequate to handle waste from construction operations. Comply with requirements of authorities having jurisdiction. Comply with progress cleaning requirements in Section 01 73 00: Execution.

H. Lifts and Hoists:
1. Provide facilities necessary for hoisting materials and personnel:
a. Truck cranes and similar devices used for hoisting materials are considered "tools and equipment" and not temporary facilities.

I. Temporary Elevator Use: Use of elevators is not permitted.

J. Temporary Stairs: Until permanent stairs are available, provide temporary stairs where ladders are not adequate.

K. Temporary Use of Permanent Stairs: Use of new stairs for construction traffic will be permitted, provided stairs are protected and finishes restored to new condition at time of Substantial Completion.

3.5 SIGNS

A. Furnish and install a project sign 6’-0” by 8’-0” in size. Image will be provided to the graphics printing company by the Architect after Award of Contract. Contractor will be responsible for the cost of printing the image, mounting the sign on an aluminum substrate and installing the sign at the site. The sign will include the name of the project, District, name and title of Board of Trustees, District Superintendent, Contractor, Architect, and each of the project consultants.

B. Other signs permitted at the site:

1. Warning signs.
2. Directional signs.
3. Identification signs at field offices.
4. Emergency medical services sign.
5. Signs required by Authorities Having Jurisdiction
6. Storm Water Pollution Prevention Plan sign (SWPPP)

C. Contractor shall allow no other signs to be displayed at the project site, unless authorized by the Owner/District.

3.6 SECURITY AND PROTECTION FACILITIES INSTALLATION

A. Protection of Existing Facilities:
1. Protect existing vegetation, equipment, structures, utilities, and other improvements at Project site and on adjacent properties, except those indicated to be removed or altered. Repair damage to existing facilities to the satisfaction of Owner and Architect.

B. Environmental Protection:
1. Provide protection, operate temporary facilities, and conduct construction as required to comply with environmental regulations and that minimize possible air, waterway, and subsoil contamination or pollution or other undesirable effects.

C. Temporary Erosion and Sedimentation Control:
1. Provide measures to prevent soil erosion and discharge of soil bearing water runoff and airborne dust to undisturbed areas and to adjacent properties and walkways, according to requirements of authorities having jurisdiction:
   a. Verify that flows of water redirected from construction areas or generated by construction activity do not enter or cross tree or plant protection zones.
   b. Inspect, repair, and maintain erosion and sedimentation control measures during construction until permanent vegetation has been established.
   c. Clean, repair, and restore adjoining properties and roads affected by erosion and sedimentation from Project site during the course of Project.
   d. Remove erosion and sedimentation controls and restore and stabilize areas disturbed during removal.

D. Stormwater Control:
1. Comply with requirements of authorities having jurisdiction. Provide barriers in and around excavations and subgrade construction to prevent flooding by runoff of stormwater from heavy rains.

E. Tree and Plant Protection:
1. Install temporary fencing located as indicated or outside the drip line of trees to protect vegetation from damage from construction operations. Protect tree root systems from damage, flooding, and erosion.

F. Pest Control:
1. Engage pest control services to recommend practices to minimize attraction and harboring of rodents, roaches, and other pests and to perform extermination and control procedures at regular intervals so Project will be free of pests and their residues at Substantial Completion. Perform control operations lawfully, using environmentally safe materials.

G. Site Enclosure Fence:
1. Before construction operations begin, provide site enclosure fence to prevent people and animals from easily entering site except by entrance gates:

a. Extent of fence: As required to enclose entire Project site or portion determined sufficient to accommodate construction operations.

H. Security Enclosure and Lockup:
1. Install temporary enclosure around partially completed areas of construction. Provide lockable entrances to prevent unauthorized entrance, vandalism, theft, and similar violations of security. Lock entrances at end of each Work day.

I. Barricades, Warning Signs, and Lights:
1. Comply with requirements of authorities having jurisdiction for erecting structurally adequate barricades, including warning signs and lighting.

J. Temporary Egress:
1. Maintain temporary egress from existing occupied facilities as indicated and as required by authorities having jurisdiction.

K. Temporary Enclosures:
1. Provide temporary enclosures for protection of construction, in progress and completed, from exposure, foul weather, other construction operations, and similar activities. Provide temporary weather-tight enclosure for building exterior:
   a. Where heating or cooling is needed and permanent enclosure is incomplete, insulate temporary enclosures.

L. Temporary Partitions:
1. Provide floor-to-ceiling dustproof partitions to limit dust and dirt migration and to separate occupied areas from fumes and noise:
   a. Construct dustproof partitions with gypsum wallboard with joints taped on occupied side and fire retardant treated plywood on construction operations side.
   b. Construct dustproof partitions with two layers of 6-mil (0.14 mm) polyethylene sheet on each side. Cover floor with two (2) layers of 6-mil (0.14 mm) polyethylene sheet, extending sheets 18 inches (460 mm) up the sidewalls. Overlap and tape full length of joints. Cover floor with fire retardant treated plywood. Do not apply tape to finish floor surfaces:
      1) Construct vestibule and airlock at each entrance through temporary partition with not less than 48 inches (1219 mm) between doors. Maintain water dampened foot mats in vestibule.
   c. Where fire resistance rated temporary partitions are indicated or are required by authorities having jurisdiction, construct partitions according to the rated assemblies.
   d. Insulate partitions to control noise transmission to occupied areas.
   e. Seal joints and perimeter. Equip partitions with gasketed dustproof doors and security locks where openings are required.
   f. Protect air handling equipment.
   g. Provide walk-off mats at each entrance through temporary partition.

M. Temporary Fire Protection:
1. Install and maintain temporary fire protection facilities of types needed to protect against reasonably predictable and controllable fire losses. Comply with NFPA 241; manage fire-prevention program:
   a. Prohibit smoking in construction areas.
   b. Supervise welding operations, combustion type, temporary heating units, and similar sources of fire ignition according to requirements of authorities having jurisdiction.
   c. Develop and supervise an overall fire prevention and protection program for personnel at Project site. Review needs with local fire department and establish procedures to be followed. Instruct personnel in methods and procedures. Post

warnings and information.

d. Provide temporary standpipes and hoses for fire protection. Hang hoses with a warning sign stating that hoses are for fire protection purposes only and are not to be removed. Match hose size with outlet size and equip with suitable nozzles.

3.7 MOISTURE AND MOLD CONTROL

A. Contractor's Moisture Protection Plan:
1. Avoid trapping water in finished Work. Document visible signs of mold that may appear during construction.

B. Exposed Construction Phase:
1. Before installation of weather barriers, when materials are subject to wetting and exposure to airborne mold spores, protect as follows:
   a. Protect porous materials from water damage.
   b. Protect stored and installed material from flowing or standing water.
   c. Keep porous and organic materials from coming into prolonged contact with concrete.
   d. Remove standing water from decks.
   e. Keep deck openings covered or dammed.

C. Partially Enclosed Construction Phase:
1. After installation of weather barriers but before full enclosure and conditioning of building, when installed materials are still subject to infiltration of moisture and ambient mold spores, protect as follows:
   a. Do not load or install drywall or other porous materials or components, or items with high organic content, into partially enclosed building.
   b. Keep interior spaces reasonably clean and protected from water damage.
   c. Periodically collect and remove waste containing cellulose or other organic matter.
   d. Discard or replace water-damaged material.
   e. Do not install material that is wet.
   f. Discard, replace, or clean stored or installed material that begins to grow mold.
   g. Perform Work in a sequence that allows any wet materials adequate time to dry before enclosing the material in drywall or other interior finishes.

D. Controlled Condition Phase of Construction:
1. After completing and sealing of the building enclosure but prior to the full operation of permanent HVAC systems, maintain as follows:
   a. Control moisture and humidity inside building by maintaining effective dry-in conditions.
   b. Use permanent HVAC system to control humidity.
   c. Comply with manufacturer's written instructions for temperature, relative humidity, and exposure to water limits and moisture control:
      1) Hygroscopic materials that may support mold growth, including wood and gypsum-based products, which become wet during the course of construction and remain wet for 48 hours are considered defective and are to be removed and replaced.
      2) Measure moisture content of materials that have been exposed to moisture during construction operations or after installation. Record readings beginning at time of exposure and continuing daily for 48 hours. Identify materials containing moisture levels higher than allowed. Report findings in writing to Architect.
      3) Remove materials that cannot be completely restored to their manufactured moisture level within 48 hours.

3.8 OPERATION, TERMINATION, AND REMOVAL

A. Supervision:
   1. Enforce strict discipline in use of temporary facilities. To minimize waste and abuse, limit availability of temporary facilities to essential and intended uses.

B. Maintenance:
   1. Maintain facilities in good operating condition until removal:
      a. Maintain operation of temporary enclosures, heating, cooling, humidity control, ventilation, and similar facilities on a 24-hour basis where required to achieve indicated results and to avoid possibility of damage.

C. Temporary Facility Changeover:
   1. Do not change over from using temporary security and protection facilities to permanent facilities until Substantial Completion unless otherwise required and approved by Owner and Architect.

D. Termination and Removal:
   1. Remove each temporary facility when need when its service has ended, when it has been replaced by authorized use of a permanent facility, or no later than Substantial Completion. Complete or, if necessary, restore permanent construction that may have been delayed because of interference with temporary facility. Repair damaged Work, clean exposed surfaces, and replace construction that cannot be satisfactorily repaired:
      a. Materials and facilities that constitute temporary facilities are property of Contractor. Owner reserves right to take possession of Project identification signs.
      b. Remove temporary roads and paved areas not intended for or acceptable for integration into permanent construction. Where area is intended for landscape development, remove soil and aggregate fill that do not comply with requirements for fill or subsoil. Remove materials contaminated with road oil, asphalt and other petrochemical compounds, and other substances that might impair growth of plant materials or lawns. Repair or replace street paving, curbs, and sidewalks at temporary entrances, as required by authorities having jurisdiction.
      c. At Substantial Completion, repair, renovate, and clean permanent facilities used during construction period. Comply with final cleaning requirements specified in Section 01 77 22: Substantial Completion Procedures.

END OF SECTION 01 50 00

SECTION 01 55 26 TRAFFIC CONTROL

PART 1 GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Work consists of furnishing traffic control devices and services for the control and protection of traffic through the area of construction in accordance with the Drawings and Specifications and in conformity with the details and at the locations shown on the approved plans for Temporary Traffic Control or as established by local ordinances and/or CalTrans Engineer.

B. Safe Traffic Flow to and through the Project site shall be maintained at all times.

C. Traffic control shall conform to CalTran's encroachment permit requirements or as designated by local ordinances.

1.3 SUBMITTALS

A. Prior to beginning construction, Contractor shall apply for any and all traffic related permits and/or encroachments required by CalTrans or local jurisdictions. Provide detailed plans, indicating direction and placement of traffic altering devices, including advanced warning signage and detour signage required for Project. Temporary Traffic Control plan must be approved by Architect, subjected to CalTrans permitting prior to beginning construction activities.

PART 2 PRODUCTS (NOT USED)

PART 3 EXECUTION

A. There will be no interruption of traffic on adjacent and feeder roads to the residential and commercial usage by maintaining a minimum of one-way traffic.

B. No construction shall begin until all traffic control signs and devices are installed by Contractor.

END OF SECTION 01 55 26

SECTION 01 57 13
EROSION CONTROL

PART 1 - GENERAL

1.1 INCLUSION OF OTHER CONTRACT DOCUMENTS

A. Drawings and general provisions of the contract, including general and supplementary conditions and other division 01 specification sections, apply to this section.

1.2 SCOPE OF WORK

A. General: Provide all materials, equipment and labor necessary to furnish and install erosion and sediment control measures as required by the State Water Resources Control Board Permit requirements and the Erosion Control Plan prepared for this project and part of the project plans. The disturbed area for this project should be less than one-acre therefore a SWPPP is not required. If the contractor disturbs more than one acre, the contractor shall be responsible for preparing and implementing a project SWPPP as well as any associated permit and inspection fees.

B. The contractor will be responsible for implementing and maintaining the BMP's as shown on the Erosion Control Plan.

1.3 QUALITY ASSURANCE

A. General: Comply with State and local codes and regulations.

PART 2 - PRODUCTS

2.1 MATERIALS

A. Supply all material as shown and described on the Erosion Control Plan.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Install all items necessary as shown on the Erosion Control Plan or as required by State and local agencies.

3.2 MAINTENANCE AND REMOVAL:

A. General: Maintain and repair existing and new erosion control facilities and BMP's throughout the construction period. Remove silt build up as needed. Repair damage to earth slopes and banks. Erosion control measures shall be left in place for the duration of the project until landscaping is complete.

B. Monitoring: The Coastside Fire Protection District shall provide monitoring of erosion control measures before and after storm events. Provide a daily log of construction activities and impact on erosion control measures. CFD will employ a Qualified SWPPP Practitioner (QSP) to inspect

the site as required by the State General Permit. If required by the District, the contractor shall update SWPPP continuously throughout construction period, and provide any changes to the Qualified SWPPP Developer (QSD). Daily log shall be available on site at all times.

C. Cleaning: Keep the area clean of debris.

D. Removal: Remove all erosion control measures after landscaping is complete.

END OF SECTION 01 57 13

SECTION 01 57 15 INTEGRATED PEST MANAGEMENT

PART 1 GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section includes requirements including but not limited to:
   1. Indoor populations of rodents, insects (including termites), arachnids, and arthropods.
   2. Outdoor populations of potentially indoor-infesting species within property boundaries.
   3. Nests of stinging insects within 20 feet of the building and within the property boundaries.
   4. Pest populations that are incidental invaders inside the building, including but not limited to:
      a. Birds, bats, snakes, and vertebrates other than commensal rodents.
      b. Pests that primarily feed on outdoor vegetation.
   5. Initial building and site inspection.
   6. Development of an Integrated Pest Management (IPM) Plan for building, site, and local ecosystems.
   7. Implementation of IPM Plan.
   8. Documentation of IPM services.

1.3 DEFINITIONS

A. Definitions: Defined in ASTM E2114.

B. Action Threshold:
   1. The level at which action is initiated determined by an acceptable threshold of pests that can be tolerated:
      a. The action threshold reflects the pest management objective for the site. The presence of some pests does not necessarily require action. When pest populations exceed established action thresholds, action is taken.

C. Biological Control: The use of living organisms such as parasites, predators, or pathogens to maintain pest populations.

D. Cultural Control: The manipulations of site ecosystem that make it less friendly to the establishment and proliferation of pest populations.

E. Exclusion: The practice of structural and procedural modifications to reduce access used by pests.

F. Integrated Pest Management (IPM): An approach to pest management that uses current, comprehensive information on the life cycles of pests and interactions with the environment to identify and implement effective methods of pest control with the least possible hazard to people, property, and the environment.

G. Mechanical Control: The use of one or more physical components of the environment, such as temperature, humidity, or light, to the detriment of the pest.

H. Phenology: The annual cycles of plants and animals and their response to seasonal changes in the environment.

1.4 SUBMITTALS

A. Integrated Pest Management (IPM) Plan:
1. Minimum ten (10) days prior to pre-construction meeting, submit an IPM Plan including, but not limited to, the following:
   a. Verify key pests and action thresholds for each key pest appropriate to Project, local ecosystem, and climate.
   b. Proposed IPM strategies:
      1) For each key pest, submit an appropriate strategy for the building, site, and local ecosystems. Indicate strategies for inspection, prevention, and response to identified pest problems:
         a) Inspection: Describe methods and procedures for identifying sites of pest harborage and access, and for objective assessments of pest population levels throughout the term of the Contract.
         b) Prevention: Describe recommended methods and procedures for prevention of pest harborage and access.
         c) Response: Indicate prioritization of strategies including utilization of nonchemical controls and lesser risk options before resorting to chemical control and actions with greater risk factors.
2. For proposed materials and equipment, provide brand names of pesticide application equipment, rodent bait boxes, insect and rodent trapping devices, pest monitoring devices, pest detection equipment, and pest control devices or equipment that may be used to provide service:
   a. Commercial Pesticide Applicator certificates or licenses: Submit photocopies of Commercial Pesticide Applicator certificates or licenses issued by the State of California for each applicator performing onsite services.
   b. Pesticides:
      1) Submit:
         a) Product data indicating conformance to U.S. National Organics Program (NOP) Final Rule list.
         b) Current EPA registered label.
         c) Material Safety Data Sheet (MSDS). Current prepared MSDS (updated within the previous five [5] years) including responses to Sections 1 through 16 in accordance with ANSI Z400.1:
            a) Section 11: Toxicological Information. Include data used to determine the hazards cited in Section 3. Identify acute data, carcinogenicity, reproductive effects, and target organ effects.
            b) Section 12: Ecological Information. Include data regarding environmental impacts in the event of an accidental release.
            c) Section 13: Disposal Considerations. Include data regarding the proper disposal of the chemical. Indicate whether or not the product is considered to be "hazardous waste" according the US EPA Hazardous Waste Regulations 40 CFR 261.
            d) Section 14: Transportation Information. Identify hazard class for shipping.
            e) Section 15: Regulatory Information. Identify federal, state, and local regulations applicable to the material.
3. Service schedule:
   a. Submit service schedule that includes weekly or monthly frequency of applications, specific day(s) of the week, and approximate duration of each application:
      1) Commencement of service: Start of construction.
4. Revise and resubmit Plan as required by Owner. Approval of IPM Plan does not relieve Contractor of responsibility for compliance with applicable environmental regulations.

B. Baseline IPM Reports:
   1. Prior to commencement of IPM Plan, submit the following:
      a. Initial building inspection report: Conduct site visit to verify the pest control needs of each location and identify problem areas and necessary equipment, structural features, or management practices that contribute to pest infestations. Submit report summarizing observations. Indicate proposed revisions, if any, to approved IPM Plan necessary based upon results of the initial building inspection.
      a. Summary of conventional pest management controls for key pests: Submit summary of conventional pest management materials and methods applicable to site and building for key pests. Include each type of pesticide, application rates, estimated annual quantity required, and environmental issues of concern.

C. Operations and Maintenance Manual:
   1. Submit instructions for operations and maintenance procedures associated with IPM services:
      a. Include overview of potential pest problems, conventional practices and environmental impacts, and IPM practices and environmental impacts.
      b. Coordinate with landscaping maintenance program.
      c. Coordinate with building cleaning and routine maintenance programs.

D. Field Quality Control Documentation:
   1. Submit the following:
      a. IPM inspection reports.
      b. IPM deficiency reports.
      c. IPM log book.

1.5 QUALITY ASSURANCE

A. Regulatory Requirements:
   1. Provide pesticides registered with U.S. Environmental Protection Agency (EPA) and acceptable to local jurisdictions.

B. Pest Controller Qualifications:
   1. Firm having a minimum of five (5) years of documented experience in performing pest control services, specifying who is certified as Commercial Pesticide Applicators in the category of Industrial, Institutional, Structural, and Health Related Pest Control, and who employs Certified Pesticide Applicators. Uncertified applicators working under the supervision of a Certified Applicator are not permitted to provide services.
   2. IPM Star certification:
      a. IPM Star Service Provider in accordance with the IPM Institute of North America's certification program.

C. Prohibited Pesticides:
   1. Do not apply pesticides that are not included in the approved IPM Plan or approved in writing by Owner:
      a. Notification: Notify Owner a minimum of 72 hours prior to application of pesticides. Exceptions may be made for applications made for emergencies, where an imminent threat to health exists (i.e., stinging insects). For emergency applications, make notification as soon as practical.

D. Pre-construction Meeting: Conduct meeting with Owner, Architect, and subcontractors to discuss the proposed IPM Plan and to develop mutual understanding relative to details of environmental protection.

E. Coordination:
   1. Coordinate with Indoor Air Quality (IAQ) Management Plan to verify moisture controls

are appropriate to IPM Plan.
2. Coordinate with Waste Management Plan to verify sanitation levels are appropriate to anticipated IPM Plan.
3. Coordinate with progress cleaning methods verifying sanitation levels are appropriate to anticipated IPM Plan.

1.6 PERFORMANCE REQUIREMENTS

A. Key Pests and Action Thresholds:

Key Pest	Action Threshold	
	Interior	Exterior
Birds	1 bird	1 nest on building
Rats, Rodents, Opossum, similar	Any evidence of presence within building envelope	Any evidence of rats
Flies	1 complaint (when one or more become a nuisance)	1 complaint (when one or more become a nuisance); 30 per day based on monitoring count
Ants	1 complaint	1 fire ant mound within 100 feet of building/pavement
Cockroaches	1 cockroach in public areas or fresh food areas	n/a
Pantry Pests (meal moth)	1 complaint	n/a
Crickets	1 complaint	n/a
Weeds	n/a	tbd

B. Minimization of Risk:
1. Employ the pesticide with least risk, most precise application technique, and minimum quantity of pesticide necessary to achieve control:
   a. Application of pesticides in an exterior or interior area shall not occur until a visual inspection is performed or monitoring devices indicate the presence of pests in that area.
   b. Owner will evaluate recommendations for preventive pesticide treatments where inspection indicates a potential insect or rodent infestation on a case-by-case basis. Owner will approve preventative pesticide application in writing prior to treatment.

1.7 DELIVERY, STORAGE, AND HANDLING

A. Do not store pesticides onsite.

B. Transport, handle, and use pesticides in strict accordance with the manufacturer's label instructions and applicable laws and regulations.

PART 2 GENERAL

2.1 CHEMICAL CONTROLS

A. Prohibited Pesticides:
1. Pesticides containing active ingredients classified as known, likely or probable

carcinogens or reproductive toxins according to any of the following lists: State of California EPA List of Chemicals Known to Cause Cancer or Reproductive Toxicity, State of Illinois EPA List of Known Endocrine Disrupters, US EPA List of Chemicals Evaluated for Carcinogenic Potential.

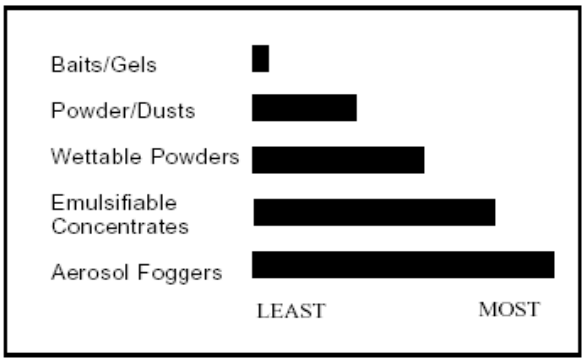
2. Pesticides containing inert ingredients included on US EPA's List 1: Inerts of Toxicological Concern.
3. Pesticide formulations and uses presenting a potential physical hazard or dust/powder inhalation hazard to building occupants.
4. Pesticides with label precautionary statements including "toxic" or "extremely toxic" to bees, birds, fish or wildlife. *Does not apply to pesticides used as per label directions to control bird, fish, wildlife or stinging insect pests.*
5. Pesticides with label precautionary statements including specific warnings regarding ground or surface water contamination.

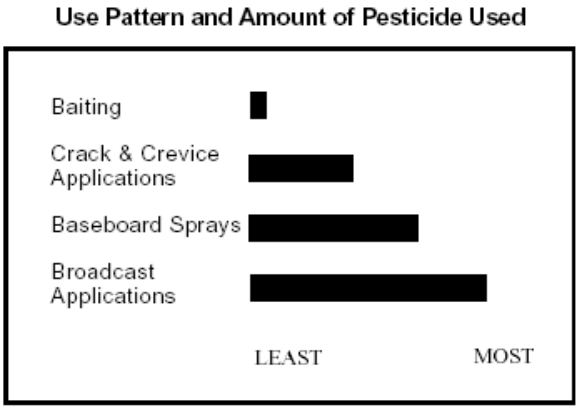
B. Lesser Risk Pesticides:

1. Materials listed on the U.S. National Organic Program's Final Rule, US Code of Federal Regulations 7CFR 205 list of acceptable materials and as follows:
   a. Crawling insects - Boric acid-based or plant-based pesticides:
      1) Botanical pesticides: Pyrethrum, neem formulations, rotenone, and others as approved by Owner.
   b. Rodents - Vitamin D3 (Cholecalciferol) or Quintox.
   c. Weeds - Plant based pesticides and herbicides. Coordinate with Section 32 90 00: Planting:
      1) Botanical pesticides: Pyrethrum, neem formulations, rotenone, and others as approved by Owner.
   d. Plant diseases - Plant based fertilizers. Coordinate with Section 32 90 00: Planting:
      1) Compost teas: Verify that compost tea does not include invasive species, including seeds. Verify that compost tea does not include animal pathogens.

C. Lesser Risk Pesticide Application Methodologies:

Likelihood the Pesticide Will Become Airborne





PART 3 GENERAL

3.1 NON-CHEMICAL PEST MANAGEMENT

A. Provide IPM in accordance with approved IPM Plan and as follows:
   1. Cultural controls:
      a. Sanitation and exclusion: Recommend structural and procedural modifications as appropriate to reduce food, water, harborage, and access used by pests.
      b. Soils: Maintain healthy, biologically active soils. Coordinate with Section 32 90 00: Planting.
      c. Habitat for beneficial organisms: Recommend modifications as appropriate to promote healthy habitat for beneficial organisms. Habitat enhancement may include flowering annual or perennial plants that provide pollen and nectar needed during certain parts of the insect life cycle, overwintering sites, and wind protection. Coordinate with Section 32 90 00: Planting.
      d. Phenology: Determine correlation with insect emergence and pest control. Develop recommendations as appropriate.
   2. Mechanical controls:
      a. Traps:
         1) Rodents: Trapping devices shall be the standard method for indoor rodent control. All such devices shall be concealed out of the general view and in protected areas so as not to be affected by routine cleaning and other operations.
         2) Insects: Trapping devices shall be the standard method for indoor fly control.
      b. Vacuums:
         1) Insects: Portable vacuums shall be the standard method for initial cleanouts of cockroach infestations, ants, termites, and for control of spiders in webs.
      c. Flame weeding: Unless otherwise approved by Owner, flame weeding shall not be permitted.
      d. Mulches, living or non-living:
         1) Weeds: Mulch shall be used for suppression of weeds, insect pests, and plant diseases as appropriate. Coordinate with Section 32 90 00: Planting.
      e. Boiling water:
         1) Fire Ants (exterior): Boiling water shall be the standard method for control of exterior fire ants. Use boiling water at a rate of approximately three (3) gallons per mound.
   3. Biological controls:
      a. Lady bugs, nematodes, and other biological controls: Permitted only for control of exterior ants, aphids, and/or other insects as appropriate. Coordinate with Section 32 90 00: Planting.
      b. Bats: Permitted only for control of exterior insects as appropriate.

3.2 CHEMICAL PEST MANAGEMENT

A. Chemical Controls: Unless otherwise approved by Owner, Contractor shall use non-chemical methods of control. When pesticide use is necessary, Contractor shall employ the least risk, NOP-listed pesticide, most precise application technique, and minimum quantity of pesticide necessary to achieve control.

B. Bait Boxes:
   1. Bait boxes shall be maintained with an emphasis on the safety of non-target organisms:
      a. Bait boxes shall be placed out of the general view, in locations where they will not be disturbed by routine operations.
      b. Lids shall be securely locked or fastened shut.
      c. Bait boxes shall be securely attached or anchored to floor, ground, wall, or another immovable surface, so that the box cannot be picked up or moved.
      d. Bait shall be secured in the feeding chamber of the box and never placed in the runway or entryways of the box.
      e. Bait boxes shall be labeled on the inside with Contractor's business name and address and dated by Contractor's technician at the time of installation and each servicing.

3.3 PEST REMOVAL

A. Pest Removal: Remove traps, bait boxes, and their contents according to the approved IPM Plan and as requested by Owner.

3.4 SPECIAL REQUESTS AND EMERGENCY SERVICE

A. On occasion, Owner may request that Contractor perform corrective, special, or emergency service(s) that are beyond routine service requests. Contractor shall respond to these exceptional circumstances and complete the necessary work within three (3) hours after receipt of the request.

3.5 FIELD QUALITY CONTROL

A. Inspection:
   1. Inspect building and site for pests and beneficials to gather information about the health of the landscaping and local ecosystem, pests, and natural enemies:
      a. Methods:
         1) Use methods indicated in approved IPM Plan and as follows:
            a) Sweep nets, sticky traps, and pheromone traps may be used to collect insects for both identification and population density information.
            b) Leaf counts may be used for recording plant growth stages.
            c) Square foot or larger grids laid out in a field may provide a basis for comparative weed counts.
            d) Records of rainfall and temperature may be used to help predict the likelihood of disease infections.
      b. Schedule: Inspect at regular intervals and at critical times in accordance with approved IPM Plan.
      c. Reports: Document results of inspections. Submit using GSA Form 3638, Pest Control Work and Inspection Report.

B. Recommendations:
   1. Throughout the term of this Contract, Contractor shall be responsible for advising Owner about any structural, sanitary, or procedural modifications that would reduce

pest food, water, harborage, or access:

a. Contractor shall be responsible for adequately suppressing all pests included in this Contract regardless of whether or not the suggested modifications are implemented.
b. Contractor will not be held responsible for carrying out structural modifications as part of the pest control effort; however, minor applications of caulk and other sealing materials by Contractor to eliminate pest harborage or access may be approved by Owner on a case by case basis. Contractor shall obtain the approval of Owner prior to application of sealing material and other structural modification.

C. Log Book:

1. Maintain a pest control logbook or file at the site. For each visit of the applicator, record:
   a. IPM Plan: A copy of the approved IPM Plan.
   b. IPM contact list: Include contact information for Contractor and Owner contact. Indicate emergency contact information for Contractor.
   c. Schedule: Contractor's service schedule for the property. Identify IPM activity that has been performed.
   d. Product data: A list of all pesticides used on property and product data for each as follows:
      1) Product data indicating conformance to U.S. National Organics Program (NOP) Final Rule list.
      2) Current EPA-registered label.
      3) Material Safety Data Sheet.
   e. IPM inspection reports and deficiency reports.
   f. Pest diagrams: Plans and site drawings noting the location of pest activity, including the location of all traps, trapping devices, and bait stations in or around the site.

END OF SECTION 01 57 15

SECTION 01 57 23 TEMPORARY STORM WATER POLLUTION CONTROL

PART 1 GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Requirements:
1. Contractor shall exercise every reasonable precaution to protect channels, storm drains, and bodies of water from pollution.
2. Schedule and conduct operations to minimize or avoid muddying and silting channels, drains, and waters.
3. As required, obtain permits for erosion and water pollution control from the appropriate jurisdictional agency before starting Work.
4. Provide any necessary water pollution control devices to prevent, control, and abate water pollution, and implement good housekeeping pollution control measures to reduce the discharge of pollutants from Work sites to the maximum extent practicable. These water pollution control devices include drains, gutters, slope protection blankets and retention basins, and shall be constructed concurrently with other Work at the earliest practicable time.
5. Exercise care in preserving vegetation and protecting property to avoid disturbing areas beyond the limits of the Work. Promptly repair any damage caused by Contractor operations.
6. Comply with the specific requirements based on acreage of disturbed soil.
7. Penalties: Failure to comply with this Section may result in significant fines and possible imprisonment. The RWQCB or other prosecuting authority may assess fines of up to $32,500 per day for each violation. Should Owner be fined or penalized as a result of Contractor failing to comply with this Section, Contractor shall reimburse Owner for any and all fines, penalties and related costs.
8. Notification and report: If pollution occurs in the Work area for any reason or when Contractor becomes aware of any violation of this Section, correct the problem and immediately notify the Inspector. In addition, submit a written report to the Engineer within seven (7) calendar days describing the incident and the corrective actions taken. If either the Inspector or Engineer is first to observe pollution or a violation, Contractor shall also explain in the written report why the Work was inadequately monitored.
9. The provisions of this Section describe minimum compliance and do not preclude other more stringent stormwater pollution control measures that may be required in the Contract.

1.3 DEFINITIONS

A. Construction Activity: Operations such as clearing; grading; disturbances to the ground, such as stockpiling; or excavation that results in soil disturbances. If construction activity is part of a larger common plan of development, the amount of disturbed soil is the total land area of disturbed soil that results under the common plan.

1.4 LIABILITIES AND PENALTIES

A. Payment of penalties for noncompliance by Contractor shall be the sole responsibility of Contractor.

B. Compliance with the Clean Water Act is the sole responsibility of Contractor. Owner shall recover all costs of any fine against Owner due to noncompliance by Contractor by appropriate Owner Assessment.

PART 2 (NOT USED)

PART 3 EXECUTION

3.1 GENERAL

A. Construction activity:
1. Comply with the following minimum water quality protection requirements:
   a. Retain eroded sediments and other pollutants onsite and do not allow transportation from the site by sheet flow, swales, area drains, natural drainage, or wind. Control slope and channel erosion by implementing an effective combination of best management practices (BMPs). Such BMPs include scheduling grading during non-rainy seasons, planting and maintaining vegetation on slopes, and covering erosion-susceptible slopes.
   b. Protect stockpiles of earth and other construction-related materials from being transported from the site by wind or water.
   c. Properly store and handle fuels, oils, solvents, and other toxic materials to not contaminate the soil or surface waters, enter the groundwater, or be placed where they may enter a live stream, channel, drain, or other water conveyance facility. Protect all approved toxic storage containers from weather. Clean spills immediately and properly dispose of cleanup materials. Spills shall not be washed into live streams, channels, drains, or other water conveyance facilities:
      1) If rain or storm water runoff comes in contact with pollutants (such as soil stabilizers, paint, or fluid from vehicles) report to Inspector immediately. Contractor will be required to sample and remediate contaminated water.
   d. Do not wash excess or waste concrete into the public way or any drainage system. Retain concrete wastes onsite until they can be appropriately disposed of or recycled.
   e. Deposit trash and construction-related solid wastes in covered receptacles to prevent contamination of rainwater and dispersal by wind.
   f. Do not allow sediments and other materials to be tracked from the site by vehicle traffic. Stabilize construction entrance roadways to inhibit sediments from being deposited onto public ways. Immediately sweep up accidental depositions. Do not allow depositions to be washed away by rain or by any other means.
   g. Contain non-stormwater runoff from equipment or vehicle washing and any other activity at the worksite.
   h. At completion of the Work, clear the worksite of debris and restore to a condition at least equal to or better than prior to construction.

3.2 MAINTENANCE

A. To ensure the proper implementation and functioning of control measures, Contractor shall regularly inspect and maintain the construction site. Contractor shall identify corrective actions and time needed to address any deficient measures or reinitiate any measures that have been discontinued. Inspections of the construction site shall be conducted by Contractor to identify deficient measures, as follows:
1. Prior to a forecasted storm.
2. At 24-hour intervals during extended precipitation events.
3. After all precipitation that causes runoff capable of carrying sediment from the construction site.

4. Routinely, at a minimum of once every week during the rainy season (October 1st– April 30th) and once every month during the non-rainy season (May 1st – September 30th).

B. All temporary and/or permanent post-construction control measures shall be maintained and regularly inspected by Project Contractor after all improvements are in place and accepted by Owner. Temporary and/or permanent post-construction landscaping maintenance shall include, but not be limited to, watering, seeding, hydro-seeding, matting, slope stabilization, re-vegetation, and any other maintenance control measures recommended by Owner to insure proper erosion control and plant growth.

END OF SECTION 01 57 23

SECTION 01 60 00 PRODUCT REQUIREMENTS

PART 1 GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section includes administrative and procedural requirements for selection of products, including but not limited to:
   1. Product delivery, storage, and handling.
   2. Manufacturers' written warranties on products.
   3. Special warranties.
   4. Comparable products.

1.3 DEFINITIONS

A. Basis of Design Product Specification:
   1. A Specification in which a specific manufacturer's product is named and accompanied by the words *basis of design*, including make, model number, or other designation to establish the significant qualities related to type, function, dimension, in-service performance, physical properties, appearance, and other characteristics for purposes of evaluating comparable products of additional manufacturers named in the Specification.

B. Products:
   1. Items obtained for incorporating into the Work, whether purchased for Project or taken from previously purchased stock. The term *product* includes the terms *material*, *equipment*, *system*, *assembly*, and terms of similar intent:
      a. Named products: Items identified by manufacturer's product name, including make, model number, or other designation shown or listed in manufacturer's published product literature current as of date of the Contract Documents.
      b. New products: Items that have not previously been incorporated into another project or facility. Products salvaged or recycled from other projects are not considered new products.
      c. Comparable product: Product that is demonstrated and approved through submittal process to have the indicated qualities related to type, function, dimension, in-service performance, physical properties, appearance, and other characteristics that equal or exceed those of specified product.

1.4 SUBMITTALS

A. Comparable Product Requests:
   1. Submit request for consideration of each comparable product. Identify product or fabrication or installation method to be replaced. Include Specification Section number and title, and Drawing number(s) and title(s):
      a. Include data to indicate compliance with the specified requirements.
      b. Architect's action: If necessary, Architect will request additional information or documentation for evaluation within one (1) week of receipt of a comparable product request. Architect will notify Contractor of approval or rejection of proposed comparable product request within 15 days of receipt of request, or seven (7) days

of receipt of additional information or documentation, whichever is later:
1) Form of Approval: As specified in Section 01 33 00: Submittal Procedures.
2) Use product specified if Architect does not issue a decision on use of a comparable product request within time allocated.

B. Basis of Design Product Specification Submittal:
1. Comply with requirements in Section 01 33 00: Submittal Procedures. Show compliance with requirements.

1.5 QUALITY ASSURANCE

A. Compatibility of Options:
1. If Contractor is given option of selecting between two (2) or more products for use on Project, select a product compatible with products previously selected, even if previously selected products were also options:
   a. Each contractor is responsible for providing products and construction methods compatible with products and construction methods of other contractors.
   b. If a dispute arises between contractors over concurrently selectable but incompatible products, Architect will determine which products shall be used.

1.6 WARRANTY

A. Warranties specified in other Sections shall be in addition to, and run concurrent with, other warranties required by the Contract Documents. Manufacturer's disclaimers and limitations on product warranties do not relieve Contractor of obligations under requirements of the Contract Documents:
1. Manufacturer's warranty: Written warranty furnished by individual manufacturer for a particular product and specifically endorsed by manufacturer to Owner.
2. Warranty: Written warranty required by the Contract Documents to provide specific rights for Owner.

B. Warranties:
1. Prepare a written document that contains appropriate terms and identification, ready for execution:
   a. Specified form: When specified forms are included with the Specifications, prepare a written document using indicated form properly executed.
   b. See other Sections for specific content requirements and particular requirements for submitting special warranties.

C. Submittal Time:
1. Comply with requirements in Section 01 77 00: Closeout Procedures.

1.7 DELIVERY, STORAGE, AND HANDLING

A. Deliver, store, and handle products using means and methods that will prevent damage, deterioration, and loss, including theft and vandalism. Comply with manufacturer's written instructions.

B. Delivery and Handling:
1. Schedule delivery to minimize long-term storage at site and to prevent overcrowding of construction spaces.
2. Coordinate delivery with installation time to ensure minimum holding time for items that are flammable, hazardous, easily damaged, or sensitive to deterioration, theft, and other losses.
3. Deliver products to Project site in an undamaged condition in manufacturer's original

sealed container or other packaging system, complete with labels and instructions for handling, storing, unpacking, protecting, and installing.
4. Inspect products on delivery to determine compliance with the Contract Documents, and to determine that products are undamaged and properly protected.

C. Storage:
1. Store products to allow for inspection and measurement of quantity or counting of units.
2. Store materials in a manner that will not endanger Project structure.
3. Store products that are subject to damage by the elements under cover in a weathertight enclosure above ground, with ventilation adequate to prevent condensation.
4. Protect foam plastic from exposure to sunlight, except to extent necessary for period of installation and concealment.
5. Comply with product manufacturer's written instructions for temperature, humidity, ventilation, and weather-protection requirements for storage.
6. Protect stored products from damage and liquids from freezing.
7. Provide a secure location and enclosure at site for storage of materials and equipment by Owner's construction forces. Coordinate location with Owner.

PART 2 PRODUCTS

2.1 PRODUCT SELECTION PROCEDURES

A. Product Requirements:
1. Provide products that comply with the Contract Documents, are undamaged, and unless otherwise indicated, are new at time of installation:
   a. Provide products complete with accessories, trim, finish, fasteners, and items needed for complete installation and indicated use and effect.
   b. Standard products: If available, and unless custom products or nonstandard options are specified, provide standard products of types that have been produced and used successfully in similar situations on other projects.
   c. Owner reserves the right to limit selection to products with warranties not in conflict with requirements of the Contract Documents.
   d. Where products are accompanied by the phrase *as selected*, Architect will make selection.
   e. Descriptive, performance, and reference standard requirements in the Specifications establish salient characteristics of products.

B. Product Selection Procedures:
1. Product: Where Specifications name a single manufacturer and product, provide the named product that complies with requirements. Comparable products or substitutions for Contractor's convenience will not be considered.
2. Manufacturer/Source: Where Specifications name a single manufacturer or source, provide a product by the named manufacturer or source that complies with requirements. Comparable products or substitutions for Contractor's convenience will not be considered.
3. Products: Where Specifications include a list of names of both manufacturers and products, provide one of the products listed that complies with requirements. Comparable products or substitutions for Contractor's convenience will not be considered.
4. Manufacturers: Where Specifications include a list of manufacturers' names, provide a product by one of the manufacturers listed that complies with requirements. Comparable products or substitutions for Contractor's convenience will not be considered.

5. Basis of Design Product: Where Specifications name a product, or refer to a product indicated on Drawings, and include a list of manufacturers, provide the specified or indicated product or a comparable product by one of the other named manufacturers. Drawings and Specifications indicate sizes, profiles, dimensions, and characteristics based on the product named. Comply with requirements for consideration of an unnamed product by one of the named manufacturers.

C. Visual Matching Specification:
   1. Where Specifications require *match Architect's sample*, provide a product that complies with requirements and matches Architect's sample. Architect's decision will be final on whether a proposed product matches:
      a. If no product available within specified category matches and complies with specified requirements, comply with requirements of Section 01 25 00: Substitution Procedures and Form for proposal of product.

D. Visual Selection Specification: Where Specifications include the phrase *selected by Architect* or similar phrase, select a product that complies with requirements. Architect will select color, gloss, pattern, density, or texture from manufacturer's product line that includes both standard and premium items.

2.2 COMPARABLE PRODUCTS

A. Conditions for Consideration:
   1. Architect will consider Contractor's request for comparable product when the following conditions are satisfied. If the following conditions are not satisfied, Architect may return requests without action, except to record noncompliance with these requirements:
      a. Evidence that the proposed product does not require revisions to the Contract Documents, that it is consistent with the Contract Documents and will produce the indicated results, and that it is compatible with other portions of the Work.
      b. Detailed comparison of significant qualities of proposed product with those named in the Specifications. Significant qualities include attributes such as performance, weight, size, durability, visual effect, and specific features and requirements indicated.
      c. Evidence that proposed product provides specified warranty.
      d. List of similar installations for completed projects with project names and addresses, and names and addresses of architects and owners, if requested.
      e. Samples, if requested.

PART 3 EXECUTION (NOT USED)

END OF SECTION 01 60 00

SECTION 01 71 23 FIELD ENGINEERING

PART 1 GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section Includes:
   1. Layout of the Work.
   2. Verification of Work:
      a. Owner reserves the right to verify any Work that Inspector deems necessary.
      b. Other Sections that require surveyor to verify or measure installed Work and related item: Surveyor shall perform such verifications or measurements at Contractor's expense. Contractor shall furnish a certification, signed by both surveyor and Contractor, to Inspector.

B. Related Sections:
   1. Section 01 10 00: Summary.
   2. Section 01 31 00: Project Management and Coordination.
   3. Section 01 33 00: Submittal Procedures.

1.3 SURVEY QUALIFICATIONS AND CONTROLS

A. Professional land surveyor or registered civil engineer licensed to practice land surveying acceptable to the Contractor and the District Representative.

B. A professional land surveyor or civil engineer must have a valid license in the state of California.

C. Vertical control shall use same benchmark used in the preparation of topographic survey. When Work consists of both onsite and off-site, and benchmarks differ, an equation shall be indicated on Drawings.

D. Horizontal control for existing structures shall be the property line.

1.4 LAYOUT OF WORK

A. All work related to staking shall be by a land surveyor, or Civil Engineer, registered with the State of California to perform land surveying and employed by Contractor.

B. Before commencement of Work, surveyor shall locate all reference points and benchmarks to be used for vertical and horizontal control.

C. Surveyor shall lay out entire Work, set grades, lines, levels, control points, elevations, grids and positions.

1.5 RECORD DOCUMENTS

A. Maintain complete and accurate log of all control and survey documentation as work progresses.

B. Record, by coordinates, all utilities onsite with top of pipe elevations, at major grade and alignment changes, rim, grate, or top of curb and flow line elevations of all drainage structures and sewer manholes.

C. Indicate reference and control points on record drawings. The basis of elevation shall be one of the established benchmarks.

D. Upon Beneficial Occupancy, obtain and pay for reproducible Plans. Deliver Plans to District representative. Clearly indicate all differences between original drawings and completed Work within specified tolerances.

1.6 SUBMITTALS

A. Surveyor: Submit name, address, and license number to Owner, including any changes as they occur.

B. Field Notes: Upon request by District representative, submit copies of cut sheets, coordinate plots, data collector printouts, marked-up construction staking plans, and other documentation as available to verify accuracy of field engineering work during and at completion of Project. Submittals to Owner must be signed and sealed by surveyor and counter-signed by Contractor

C. Statement of Compliance: Contractor shall submit a statement of certification signed and sealed by surveyor, counter-signed by Contractor, indicating compliance with grades and alignment of construction Plans at rough grade, fine grade, and top of rock stages. Inspector shall approve survey submittals for each stage of construction prior to proceeding with work.

D. Upon Beneficial Occupancy: Contractor shall obtain and pay for reproducible survey drawings (or “As Built”).

E. Completed record drawings shall be signed and certified as correct and within specified tolerances by licensed surveyor. Originals and two (2) sets of blueprints shall be submitted to Owner.

PART 2 PRODUCTS (NOT USED)

PART 3 EXECUTION

3.1 PREPARATION

A. Pre-mark areas of excavation in accordance with the requirements of “Dig-Alert.” Request locators two (2) days before commencing excavation.

B. Before commencing Work, establish all horizontal and vertical reference points used in Contract Documents according to existing field conditions.

C. Preserve established reference lines and benchmarks.

D. Differentiate school and city datum as applicable.

E. Relocate benchmarks that may interfere with Work.

F. Reset and re-establish reference marks damaged or lost during construction.

3.2 SURVEY REQUIREMENTS GENERAL

A. Preserve and protect all on-site underground utility lines and existing on-site improvements in the area of construction.

B. Establish a minimum of two (2) permanent horizontal and vertical control points on Project site, remote from construction area, referenced to data established by control points.

C. Indicate reference points, relative to benchmark elevation, on record drawings.

D. Provide grade stakes and elevations to construct over excavation and re-compaction, rough and final grades, paved areas, curbs, gutters, sidewalks, building pads, landscaped areas, and other areas as required.

E. Calculate and layout proposed finished elevations and intermediate controls, as required, to provide smooth transitions between spot elevations indicated on Drawings.

F. Provide stakes and elevations for grading, fill, and topsoil placement.

G. Provide adequate horizontal and vertical control to locate utility lines, including but not limited to, storm, sewers, water mains, gas and electric, and signal and provide vertical control in proportion to the slope of the line as required for accurate construction. Dry utilities will be based upon adequate horizontal and vertical control layout. Prior to trench closure, survey and record invert and flow line elevations. Survey and record top of curb and flow line elevations on finished concrete or asphaltic concrete (AC), and surfaces at key locations such as beginning-of-curve (BC), end-of-curve (EC), grade breaks, corners, or angle points in sufficient number to demonstrate the Work complies with the intent of the Contract Documents.

H. Provide horizontal and vertical control for batter boards for drainage, utility, and other onsite structures as required.

I. Furnish building corner offsets as required to adequately locate building pads. Provide cut and fill stakes within the building pad perimeter adequate to control both over excavation and re-compaction and the final sub-grade elevation of the building pad.

J. Submit a certification signed by the surveyor confirming the elevations and locations of improvements are in conformance with the Contract Documents. The statement shall include survey notes for the finish floor and building pad, showing the actual measured elevations on the completed sub-grade, recorded to the nearest 0.01 of a foot. Building pad tolerance will be plus or minus 0.1 of a foot.

K. Establish a minimum of two (2) permanent horizontal and vertical control points on Project site, remote from building area, referenced to data established by survey control points.

L. Mark boundaries for rights-of-way dedications and easements for utilities prior to marking location of buildings and utilities.

M. Layout all lines, elevations, and measurements needed for construction or installation of buildings, grading, paving, and utilities according to the following:
   1. Identify site boundary and property lines.
   2. Provide working benchmarks.
   3. Set stakes for Bottom of Excavated Plane (BEP).
   4. Set gridlines, radii, working points, etc. for foundation.
   5. Set and verify building pad elevations.

6. Set finish floor elevations.
7. Stake location and elevations for exterior ramps and stairs.
8. Set gridlines, radii, working points, etc., for all floors of multi-story buildings.
9. Set storm drain, sanitary sewer inverts, and other utilities as needed at five-foot (5') off-set from building lines.
10. For new facilities, establish permanent onsite benchmark with two-inch (2") diameter brass disk. Location of benchmark to be determined by Owner.

3.3 SURVEY REQUIREMENTS FOR GRADING

A. Provide grade stakes and elevations as follows:
   1. Removal limits (cut lines).
   2. Rough grade staking: 60-foot maximum grid plus additional stakes at grade changes and pertinent locations. Flag all grade changes including ridges, flow lines, and grade breaks.
   3. Fine grade for top of dirt: 30-foot maximum grid plus additional stakes at grade changes and pertinent locations. Flag all grade changes including ridges, flow lines, and grade breaks.
   4. Verify fine grade for top of rock: 30-foot maximum grid plus additional stakes at grade changes and pertinent locations. Flag all grade changes including ridges, flow lines, and grade breaks.
   5. Finish grade marks on all buildings, structures, and at pertinent locations.
   6. Finish grades and offsets for all concrete work, utilities, landscape areas, and structures.
   7. Provide controls and baselines for playground striping.
   8. Off-site improvements: Set grades and provide grade sheets as required by local authorities.

B. Provide a minimum of two (2) permanent horizontal and vertical control points onsite, remote from building area, referenced to data established by survey control points.

3.4 SURVEY REQUIREMENTS FOR UTILITIES

A. Locate "wet" utility lines and provide vertical control proportionate to slope of line as required for accurate construction. "Dry" utilities shall have adequate horizontal and vertical control layout supplied by others.

B. Prior to back-filling trench, survey and record invert and flow line elevations. Survey and record top of curb and flow line elevations on finished surfaces at key locations (such as back of curbs, grade breaks, corners, or angle points) in sufficient number to demonstrate Work complies with intent of Contract Documents.

C. Provide horizontal and vertical control for batter boards for drainage, utility, and other onsite structures as required:
   1. Set grades for vaults one inch (1") higher than adjacent surrounding design grades, unless noted otherwise.

D. Leave all trenches open until required inspection is completed.

3.5 SURVEY REQUIREMENTS FOR STRUCTURES

A. Furnish building corner offsets as required to adequately locate building pads. Provide cut and fill stakes within building pad perimeter adequate to control both over excavation and re-compaction and final sub-grade elevation of building pad.

B. Submit a certification signed by surveyor confirming elevations and locations of improvements are in conformance with Contract Documents. Statement shall include survey notes for finish floor and building pad, showing actual measured elevations on completed sub-grade, recorded to nearest 0.01 of a foot. Building pad tolerance will be plus or minus 0.1 of a foot.

END OF SECTION 01 71 23

SECTION 01 73 00 EXECUTION

PART 1 GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section includes administrative and procedural requirements governing execution of the Work including, but not limited to, the following:
   1. Construction layout.
   2. Field engineering and surveying.
   3. Installation of the Work.
   4. Coordination of Owner-installed products.
   5. Progress cleaning.
   6. Starting and adjusting.
   7. Protection of installed construction.

1.3 DEFINITIONS

A. Cutting: Removal of in-place construction necessary to permit installation or performance of other work.

B. Patching: Fitting and repair work required to restore construction to original conditions after installation of other work.

1.4 SUBMITTALS

A. Certificates: Submit certificate signed by land surveyor or professional Engineer certifying that location and elevation of improvements comply with requirements.

B. Landfill Receipts: Submit copy of receipts issued by a landfill facility, licensed to accept hazardous materials, for hazardous waste disposal.

C. Certified Surveys: Submit two (2) copies signed by land surveyor.

D. Final Property Survey: Submit ten (10) copies showing the Work performed and record survey data.

1.5 QUALITY ASSURANCE

A. Land Surveyor Qualifications: A professional land surveyor legally qualified to practice in the State of California, who is experienced in providing land surveying services of the kind indicated.

B. Manufacturer's Installation Instructions: Obtain and maintain onsite manufacturer's written recommendations and instructions for installation of products and equipment.

PART 2 PRODUCTS

2.1 MATERIALS

A. Comply with requirements specified in other Sections.

B. In-Place Materials:
   1. Use materials for patching identical to in-place materials. For exposed surfaces, use materials that visually match in-place adjacent surfaces to the fullest extent possible:
      a. If identical materials are unavailable or cannot be used, use materials that, when installed, will provide a match acceptable to Architect for the visual and functional performance of in-place materials.

PART 3 EXECUTION

3.1 EXAMINATION

A. Existing Conditions:
   1. The existence and location of underground and other utilities and construction indicated as existing are not warranted. Before beginning site Work, investigate and verify existence and location of underground utilities, mechanical and electrical systems, and construction affecting the Work:
      a. Before construction, verify the location and invert elevation at points of connection of sanitary sewer, storm sewer, and water service piping, underground electrical services, and other utilities.
      b. Furnish location data for work related to the Work that must be performed by public utilities serving the site.

B. Examination and Acceptance of Conditions:
   1. Before proceeding with each component of the Work, examine substrates, areas, and conditions for compliance with requirements for installation tolerances and other conditions affecting performance. Record observations:
      a. Examine roughing-in for mechanical and electrical systems to verify actual locations of connections before equipment and fixture installation.
      b. Examine walls, floors, and roofs for suitable conditions where products and systems are to be installed.
      c. Verify compatibility with and suitability of substrates, including compatibility with existing finishes or primers.

C. Written Report:
   1. Where a written report listing conditions detrimental to performance of the Work is required by other Sections, include the following:
      a. Description of the Work.
      b. List of detrimental conditions, including substrates.
      c. List of unacceptable installation tolerances.
      d. Recommended corrections.

D. Proceed with installation after correcting unsatisfactory conditions. Proceeding with the Work indicates acceptance of surfaces and conditions.

3.2 PREPARATION

A. Existing Utility Information: Furnish information to Owner necessary to adjust, move, or relocate existing utility structures, utility poles, lines, services, or other utility appurtenances located in or affected by construction. Coordinate with authorities having jurisdiction.

B. Field Measurements: Take field measurements as required to fit the Work properly. Recheck measurements before installing each product. Where portions of the Work are indicated to fit to other construction, verify dimensions of other construction by field

measurements before fabrication. Coordinate fabrication schedule with construction progress to avoid delaying the Work.

C. Space Requirements: Verify space requirements and dimensions of items shown diagrammatically on Drawings.

D. Review of Contract Documents and Field Conditions: Immediately on discovery of the need for clarification of the Contract Documents caused by differing field conditions outside the control of Contractor, submit a request for information to Architect according to requirements in Section 01 31 00: Project Management and Coordination.

3.3 CONSTRUCTION LAYOUT

A. Verification: Before proceeding to lay out the Work, verify layout information shown on Drawings, in relation to the property survey and existing benchmarks. If discrepancies are discovered, notify Architect promptly.

B. Engage a land surveyor or professional Engineer to lay out the Work using accepted surveying practices:
   1. Establish benchmarks and control points to set lines and levels at each story of construction and elsewhere as necessary to locate each element of Project.
   2. Establish limits on use of site.
   3. Establish dimensions within tolerances indicated. Do not scale Drawings to obtain required dimensions.
   4. Inform installers of lines and levels to which they must comply.
   5. Check the location, level, and plumb of every major element as the Work progresses.
   6. Notify Architect when deviations from required lines and levels exceed allowable tolerances.
   7. Close site surveys with an error of closure equal to or less than the standard established by authorities having jurisdiction.

C. Site Improvements: Locate and lay out site improvements, including pavements, grading, fill and topsoil placement, utility slopes, and rim and invert elevations.

D. Building Lines and Levels: Locate and lay out control lines and levels for structures, building foundations, column grids, and floor levels, including those required for mechanical and electrical work. Transfer survey markings and elevations for use with control lines and levels. Level foundations and piers from two (2) or more locations.

E. Record Log: Maintain a log of layout control work. Record deviations from required lines and levels. Include beginning and ending dates and times of surveys, weather conditions, name and duty of each survey party member, and types of instruments and tapes used. Make the log available for reference by Architect.

3.4 FIELD ENGINEERING

A. Identification: Owner will identify existing benchmarks, control points, and property corners.

B. Reference Points:
   1. Locate existing permanent benchmarks, control points, and similar reference points before beginning the Work. Preserve and protect permanent benchmarks and control points during construction operations:
      a. Do not change or relocate existing benchmarks or control points without prior written approval of Architect. Report lost or destroyed permanent benchmarks or control points promptly. Report the need to relocate permanent benchmarks or

control points to Architect before proceeding.
b. Replace lost or destroyed permanent benchmarks and control points promptly. Base replacements on the original survey control points.

C. Benchmarks:
1. Establish and maintain a minimum of two (2) permanent benchmarks on site, referenced to data established by survey control points. Comply with authorities having jurisdiction for type and size of benchmark:
a. Record benchmark locations, with horizontal and vertical data, on Project Record Documents.
b. Where the actual location or elevation of layout points cannot be marked, provide temporary reference points sufficient to locate the Work.
c. Remove temporary reference points when no longer needed. Restore marked construction to its original condition.

D. Certified Survey: On completion of foundation walls, major site improvements, and other work requiring field-engineering services, prepare a certified survey showing dimensions, locations, angles, and elevations of construction and sitework.

E. Final Property Survey:
1. Engage a land surveyor or professional Engineer to prepare a final property survey showing significant features (real property) for Project. Include on the survey a certification, signed by land surveyor or professional Engineer, that principal metes, bounds, lines, and levels of Project are accurately positioned as shown on the survey:
a. Show boundary lines, monuments, streets, site improvements and utilities, existing improvements and significant vegetation, adjoining properties, acreage, grade contours, and the distance and bearing from a site corner to a legal point.
b. Recording: At Substantial Completion, have the final property survey recorded by or with authorities having jurisdiction as the official "property survey."

3.5 INSTALLATION

A. Locate the Work and components of the Work accurately, in correct alignment and elevation, as indicated:
1. Make vertical work plumb and make horizontal work level.
2. Where space is limited, install components to maximize space available for maintenance and ease of removal for replacement.
3. Conceal pipes, ducts, and wiring in finished areas unless otherwise indicated.
4. Maintain minimum headroom clearance of 96 inches (2,440 mm) in occupied spaces and 90 inches (2,300 mm) in unoccupied spaces.

B. Comply with manufacturer's written instructions and recommendations for installing products in applications indicated.

C. Install products at the time and under conditions ensuring the best possible results. Maintain conditions required for product performance until Substantial Completion.

D. Conduct construction operations so no part of the Work is subjected to damaging operations or loading in excess of that expected during normal conditions of occupancy.

E. Sequence the Work and allow adequate clearances to accommodate movement of construction items onsite and placement in permanent locations.

F. Tools and Equipment: Do not use tools or equipment that produce harmful noise levels.

G. Templates: Obtain and distribute to the parties involved templates for Work specified to be factory prepared and field installed. Check shop drawings of other Work to confirm that adequate provisions are made for locating and installing products to comply with indicated requirements.

H. Attachment:
   1. Provide blocking and attachment plates and anchors and fasteners of adequate size and number to securely anchor each component in place, accurately located and aligned with other portions of the Work. Where size and type of attachments are not indicated, verify size and type required for load conditions:
      a. Mounting Heights: Where mounting heights are not indicated, mount components at heights directed by Architect.
      b. Allow for building movement, including thermal expansion and contraction.
      c. Coordinate installation of anchorages. Furnish setting drawings, templates, and directions for installing anchorages, including sleeves, concrete inserts, anchor bolts, and items with integral anchors, that are to be embedded in concrete or masonry. Deliver such items to Project site in time for installation.

I. Joints: Make joints of uniform width. Where joint locations in exposed work are not indicated, arrange joints for the best visual effect. Fit exposed connections together to form hairline joints.

J. Hazardous Materials: Use products, cleaners, and installation materials that are not considered hazardous. Materials containing asbestos and BCPs are prohibited.

3.6 OWNER-INSTALLED PRODUCTS

A. Site Access: Provide access to site for Owner's construction personnel.

B. Coordination:
   1. Coordinate construction and operations of the Work with Work performed by Owner's construction personnel:
      a. Construction schedule: Inform Owner of Contractor's preferred construction schedule for Owner's portion of the Work. Adjust construction schedule based on a mutually agreeable timetable. Notify Owner if changes to schedule are required due to differences in actual construction progress.
      b. Pre-installation conferences: Include Owner's construction personnel at pre-installation conferences covering portions of the Work that are to receive Owner's Work. Attend pre-installation conferences conducted by Owner's construction personnel if portions of the Work depend on Owner's construction.

3.7 PROGRESS CLEANING

A. Clean site and Work areas daily, including common areas. Enforce requirements strictly. Dispose of materials lawfully:
   1. Comply with requirements in NFPA 241 for removal of combustible waste materials and debris.
   2. Do not hold waste materials more than seven (7) days during normal weather or three (3) days if the temperature is expected to rise above 80 degrees F (27 degrees C).
   3. Containerize hazardous and unsanitary waste materials separately from other waste. Mark containers appropriately and dispose of legally, according to regulations.
   4. Use containers intended for holding waste materials of type to be stored.
   5. Coordinate progress cleaning for joint-use areas where Contractor and other contractors are working concurrently.

B. Site: Maintain site free of waste materials and debris.

C. Work Areas:
   1. Clean areas where Work is in progress to the level of cleanliness necessary for proper execution of the Work:
      a. Remove liquid spills promptly.
      b. Where dust would impair proper execution of the Work, broom-clean or vacuum the entire Work area, as appropriate.

D. Installed Work: Keep installed Work clean. Clean installed surfaces according to written instructions of manufacturer or fabricator of product installed, using only cleaning materials specifically recommended. If specific cleaning materials are not recommended, use cleaning materials that are not hazardous to health or property and that will not damage exposed surfaces.

E. Concealed Spaces: Remove debris from concealed spaces before enclosing the space.

F. Exposed Surfaces in Finished Areas: Clean exposed surfaces and protect as necessary to ensure freedom from damage and deterioration at time of Substantial Completion.

G. Waste Disposal: Do not bury or burn waste materials onsite. Do not wash waste materials down sewers or into waterways. Comply with waste disposal requirements in Section 01 50 00: Temporary Facilities and Controls.

H. During handling and installation, clean and protect construction in progress and adjoining materials already in place. Apply protective covering where required to ensure protection from damage or deterioration at Substantial Completion.

I. Clean and provide maintenance on completed construction as frequently as necessary through the remainder of the construction period. Adjust and lubricate operable components to ensure operability without damaging effects.

J. Limiting Exposures: Supervise construction operations to assure that no part of the construction, completed or in progress, is subject to harmful, dangerous, damaging, or otherwise deleterious exposure during the construction period.

3.8 STARTING AND ADJUSTING

A. Coordinate startup and adjusting of equipment and operating components with mechanical, plumbing, and electrical requirements.

B. Start equipment and operating components to confirm proper operation. Remove malfunctioning units, replace with new units, and retest.

C. Adjust equipment for proper operation. Adjust operating components for proper operation without binding.

D. Test each piece of equipment to verify proper operation. Test and adjust controls and safeties. Replace damaged and malfunctioning controls and equipment.

E. Manufacturer's Field Service: Comply with qualification requirements in Section 01 40 00: Quality Requirements.

3.9 PROTECTION OF INSTALLED CONSTRUCTION

A. Provide final protection and maintain conditions that ensure installed Work is without damage or deterioration at time of Substantial Completion.

B. Comply with manufacturer's written instructions for temperature and relative humidity.

END OF SECTION 01 73 00

SECTION 01 73 29 CUTTING AND PATCHING

PART 1 GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section includes procedural requirements for cutting and patching.

1.3 DEFINITIONS

A. Cutting: Removal of existing construction necessary to permit installation or performance of other work.

B. Patching: Fitting and repair work required to restore surfaces to original conditions after installation of other work.

1.4 SUBMITTALS

A. Cutting and Patching Plan:
   1. Submit plan describing procedures at least ten (10) days prior to the time cutting and patching will be performed. Include the following information:
      a. Extent: Describe reason for and extent of each occurrence of cutting and patching.
      b. Changes to in-place construction: Describe anticipated results. Include changes to structural elements and operating components as well as changes in building appearance and other significant visual elements.
      c. Products: List products used for patching and firms or entities that will perform patching work.
      d. Dates: Indicate when cutting and patching will be performed.
      e. Utilities and mechanical and electrical systems:
         1) List services and systems that cutting and patching procedures will disturb or affect. List services and systems that will be relocated and those that will be temporarily out of service. Indicate length of time permanent services and systems will be disrupted:
            a) Include description of provisions for temporary services and systems during interruption of permanent services and systems.

1.5 QUALITY ASSURANCE

A. Cutting and Patching: Comply with requirements for and limitations on cutting and patching of construction elements.

B. Structural Elements: When cutting and patching structural elements, notify Architect of locations and details of cutting and await directions from Architect before proceeding. Shore, brace, and support structural elements during cutting and patching. Do not cut and patch structural elements in a manner that could change their load-carrying capacity or increase deflection.

C. Operational Elements:
   1. Do not cut and patch operating elements and related components that results in

reducing the capacity to perform as intended or that results in increased maintenance or decreased operational life or safety:
a. Primary operational systems and equipment.
b. Fire separation assemblies.
c. Air or smoke barriers.
d. Fire suppression systems.
e. Mechanical systems' piping and ducts.
f. Control systems.
g. Communication systems.
h. Fire detection and alarm systems.
i. Conveying systems.
j. Electrical wiring systems.
k. Operating systems of special construction.

D. Miscellaneous Elements:
1. Do not cut and patch the following elements or related components that change the load bearing capacity, resulting in a reduction of capacity to perform as intended, or that results in increased maintenance or decreased operational life or safety:
a. Water, moisture, or vapor barriers.
b. Membranes and flashings.
c. Exterior curtain wall construction.
d. Equipment supports.
e. Piping, ductwork, vessels, and equipment.
f. Noise and vibration control elements and systems.
g. Sprayed fire resistive material.

E. Visual Requirements:
1. Do not cut and patch construction resulting in visual evidence of cutting and patching. Do not cut and patch construction exposed on the exterior or in occupied spaces in a manner that would, in Architect's opinion, reduce the building's aesthetic qualities. Remove and replace construction that has been cut and patched in a visually unsatisfactory manner:
a. If possible, retain original installer or fabricator to cut and patch exposed Work. If possible, engage original installer or fabricator. If original installer is not available, engage recognized, experienced, and specialized firm for the Work:
1) Processed concrete finishes.
2) Ornamental metal.
3) Matched veneer woodwork.
4) Preformed metal panels.
5) Roofing.
6) Firestopping.
7) Window system.
8) Fluid applied flooring.
9) Wall covering.
10) HVAC enclosures, cabinets, or covers.

F. Cutting and Patching Conference: Before proceeding, meet at site with parties involved in cutting and patching, including mechanical and electrical trades. Review areas of potential interference and conflict. Coordinate procedures and resolve potential conflicts before proceeding.

1.6 WARRANTY

A. Existing Warranties: Remove, replace, patch, and repair materials and surfaces cut or damaged during installation or cutting and patching operations, by methods and with materials so as not to void existing warranties.

PART 2 PRODUCTS

2.1 MATERIALS

A. Comply with specified requirements.

B. Existing Materials:
   1. Use materials identical to existing materials. For exposed surfaces, use materials that visually match existing adjacent surfaces to the fullest extent possible:
      a. If identical materials are unavailable or cannot be used, use materials that, when installed, will match the visual and functional performance of existing materials.

PART 3 EXECUTION

3.1 EXAMINATION

A. Examine surfaces to be cut and patched and conditions under which cutting and patching are to be performed:
   1. Compatibility: Before patching, verify compatibility with and suitability of substrates, including compatibility with existing finishes or primers.
   2. Proceed with installation only after unsafe or unsatisfactory conditions have been corrected.

3.2 PREPARATION

A. Temporary Support: Provide temporary support of Work to be cut.

B. Protection: Protect existing construction during cutting and patching to prevent damage. Provide protection from adverse weather conditions for portions of Project that might be exposed during cutting and patching operations.

C. Adjoining Areas: Avoid interference with use of adjoining areas or interruption of free passage to adjoining areas.

D. Existing Services: Where removal, relocation, or abandonment is necessary, bypass existing services before cutting to avoid interruption of services to occupied areas.

3.3 CUTTING AND PATCHING

A. Employ skilled workers to perform cutting and patching. Proceed with cutting and patching at earliest feasible time, and complete without delay:
   1. Cut existing construction to provide for installation of components or performance of construction, and subsequently patch as necessary to restore surfaces to an original condition.
   2. Cut in place construction to provide for installation of other components or performance of other construction, and subsequently patch as required to restore surfaces to their original condition.

B. Temporary Support: Provide temporary support of Work to be cut.

C. Protection: Protect in place construction during cutting and patching to prevent damage. Provide protection from adverse weather conditions for portions of Project that might be exposed during cutting and patching operations.

D. Adjacent Occupied Areas: Where interference with use of adjoining areas or interruption of

free passage to adjoining areas is unavoidable, coordinate cutting and patching according to requirements in Section 01 10 00: Summary and what is shown on Drawings.

E. Cutting:
1. Cut existing construction by sawing, drilling, breaking, chipping, grinding, and similar operations, including excavation, using methods least likely to damage elements retained or adjoining construction. If possible, review proposed procedures with original installer; comply with original installer's written recommendations:
   a. Use hand or small power tools designed for sawing and grinding, not hammering and chopping. Cut holes and slots as small as possible, neatly to size required, and with minimum disturbance of adjacent surfaces. Temporarily cover openings when not in use.
   b. Finished surfaces: Cut or drill from exposed or finished side into concealed surfaces.
   c. Concrete and masonry: Cut using a cutting machine, such as an abrasive saw or a diamond-core drill.
   d. Excavating and backfilling: Comply with requirements in applicable earthwork specifications by cutting and patching operations.
   e. Mechanical and electrical services: Cut off pipe or conduit in walls or partitions to be removed. Cap, valve, or plug and seal remaining portion of pipe or conduit to prevent entrance of moisture or other foreign matter after cutting.
   f. Proceed with patching after construction operations requiring cutting are complete.

F. Patching:
1. Patch construction by filling, repairing, refinishing, closing up, and similar operations following performance of other Work. Patch with durable seams that are as invisible as possible. Provide materials and comply with installation requirements specified in other Sections of these Specifications:
   a. Inspection:
      1) Where feasible, test and inspect patched areas after completion to demonstrate integrity of installation.
   b. Exposed finishes:
      1) Restore exposed finishes of patched areas and extend finish restoration into retained adjoining construction to eliminate evidence of patching and refinishing:
         a) Clean piping, conduit, and similar features before applying paint or other finishing materials.
         b) Restore damaged pipe covering to its original condition.
2. Floors and walls: Where walls or partitions are removed, extend one finished area into another, patch and repair surfaces in new space. Provide even surface of uniform finish, color, texture, and appearance. Remove existing floor and wall coverings and replace with new materials, if necessary, to achieve uniform color and appearance.
3. Where patching occurs in a painted surface, apply primer and intermediate paint coats over the patch and apply final paint coat over entire unbroken surface containing the patch. Provide additional coats until patch blends with adjacent surfaces.
4. Ceilings: Patch, repair, or rehang existing ceilings as necessary to provide an even-plane surface of uniform appearance.
5. Exterior building enclosure: Patch components and restore enclosure to a weathertight condition.

END OF SECTION 01 73 29

SECTION 01 74 19 CONSTRUCTION WASTE MANAGEMENT AND DISPOSAL

PART 1 GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section includes administrative and procedural requirements for the following:
   1. Salvaging nonhazardous demolition and construction waste.
   2. Recycling nonhazardous demolition and construction waste.
   3. Disposing of nonhazardous demolition and construction waste.

1.3 DEFINITIONS

A. Construction Waste: Building and site improvement materials and other solid waste resulting from construction, remodeling, renovation, or repair operations. Construction waste includes packaging.

B. Demolition Waste: Building and site improvement materials resulting from demolition or selective demolition operations.

C. Disposal: Removal off-site of demolition and construction waste and subsequent sale, recycling, reuse, or deposit in landfill or incinerator acceptable to authorities having jurisdiction.

D. Recycle: Recovery of demolition or construction waste for subsequent processing in preparation for reuse.

E. Salvage: Recovery of demolition or construction waste and subsequent sale or reuse in another facility.

F. Salvage and Reuse: Recovery of demolition or construction waste and subsequent incorporation into the Work.

1.4 SUBMITTALS

A. Waste Management Plan: Submit plan within ten (10) days of date established for commencement of the Work.

B. Waste Reduction Progress Reports:
   1. Concurrent with each Application for Payment, submit report. Use Form CWM-7 for construction waste and Form CWM-8 for demolition waste. Include the following information:
      a. Material category.
      b. Generation point of waste.
      c. Total quantity of waste in tons (tonnes).
      d. Quantity of waste salvaged, both estimated and actual in tons (tonnes).
      e. Quantity of waste recycled, both estimated and actual in tons (tonnes).
      f. Total quantity of waste recovered (salvaged plus recycled) in tons (tonnes).
      g. Total quantity of waste recovered (salvaged plus recycled) as a percentage of total

waste.

C. Waste Reduction Calculations: Before request for Substantial Completion, submit calculated end of Project rates for salvage, recycling, and disposal as a percentage of total waste generated by the Work.

D. Records of Donations: Indicate receipt and acceptance of salvageable waste donated to individuals and organizations. Indicate whether organization is tax exempt.

E. Records of Sales: Indicate receipt and acceptance of salvageable waste sold to individuals and organizations. Indicate whether organization is tax exempt.

F. Recycling and Processing Facility Records: Indicate receipt and acceptance of recyclable waste by recycling and processing facilities licensed to accept them. Include manifests, weight tickets, receipts, and invoices.

G. Landfill and Incinerator Disposal Records: Indicate receipt and acceptance of waste by landfills and incinerator facilities licensed to accept them. Include manifests, weight tickets, receipts, and invoices.

H. Statement of Refrigerant Recovery: Signed by refrigerant recovery technician responsible for recovering refrigerant, stating that refrigerant that was present was recovered and that recovery was performed according to EPA regulations. Include name and address of technician and date refrigerant was recovered.

1.5 QUALITY ASSURANCE

A. Waste Management Coordinator Qualifications: Firm having minimum ten (10) years of documented experience in specializing in waste management coordination.

B. Refrigerant Recovery Technician Qualifications: Certified by EPA-approved certification program.

C. Regulatory Requirements: Comply with hauling and disposal regulations of authorities having jurisdiction.

D. Waste Management Conference:
1. Conduct conference at site. Review methods and procedures related to waste management including, but not limited to, the following:
   a. Review and discuss waste management plan including responsibilities of waste management coordinator.
   b. Review requirements for documenting quantities of each type of waste and its disposition.
   c. Review and finalize procedures for materials separation and verify availability of containers and bins needed to avoid delays.
   d. Review procedures for periodic waste collection and transportation to recycling and disposal facilities.
   e. Review waste management requirements for each trade.

1.6 PERFORMANCE REQUIREMENTS

A. Conform to County regulations regarding Solid Waste Control.

B. Achieve end of Project rates for salvage/recycling of 50 percent by weight of total nonhazardous solid waste generated by the Work. Practice efficient waste management in

the use of materials in the course of the Work. Use all reasonable means to divert construction and demolition waste from landfills and incinerators. Facilitate recycling and salvage of materials**:**

1. Demolition waste:
    a. Asphalt paving.
    b. Concrete.
    c. Concrete reinforcing steel.
    d. Brick.
    e. Concrete masonry units.
    f. Wood studs.
    g. Wood joists.
    h. Plywood and oriented strand board.
    i. Wood paneling.
    j. Wood trim.
    k. Structural and miscellaneous steel.
    l. Rough hardware.
    m. Roofing.
    n. Insulation.
    o. Doors and frames.
    p. Door hardware.
    q. Windows.
    r. Glazing.
    s. Metal studs.
    t. Gypsum board.
    u. Acoustical tile and panels.
    v. Carpet.
    w. Carpet pad.
    x. Demountable partitions.
    y. Equipment.
    z. Cabinets.
    aa. Plumbing fixtures.
    bb. Piping.
    cc. Supports and hangers.
    dd. Valves.
    ee. Sprinklers.
    ff. Mechanical equipment.
    gg. Refrigerants.
    hh. Electrical conduit.
    ii. Copper wiring.
    jj. Lighting fixtures.
    kk. Lamps.
    ll. Ballasts.
    mm. Electrical devices.
    nn. Switchgear and panelboards.
    oo. Transformers.
2. Construction waste:
    a. Masonry and CMU.
    b. Lumber.
    c. Wood sheet materials.
    d. Wood trim.
    e. Metals.
    f. Roofing.
    g. Insulation.
    h. Carpet and pad.
    i. Gypsum board.
    j. Piping.

k. Electrical conduit.
l. Packaging - Regardless of salvage/recycle goal indicated in "General" Paragraph above, salvage or recycle 100 percent of the following uncontaminated packaging materials:
   1) Paper.
   2) Cardboard.
   3) Boxes.
   4) Plastic sheet and film.
   5) Polystyrene packaging.
   6) Wood crates.
   7) Plastic pails.

1.7 WASTE MANAGEMENT PLAN

A. Develop a waste management plan and requirements. Plan shall consist of waste identification, waste reduction work plan, and cost/revenue analysis. Distinguish between demolition and construction waste. Indicate quantities by weight or volume but use same units of measure throughout waste management plan.

B. Waste Identification: Indicate anticipated types and quantities of demolition site clearing and construction waste generated by the Work. Use Form CWM-1 for construction waste and Form CWM-2 for demolition waste. Include estimated quantities and assumptions for estimates.

C. Waste Reduction Work Plan:
   1. List each type of waste and whether it will be salvaged, recycled, or disposed of in landfill or incinerator. Use Form CWM-3 for construction waste and Form CWM-4 for demolition waste. Include points of waste generation, total quantity of each type of waste, quantity for each means of recovery, and handling and transportation procedures:
      a. Salvaged materials for reuse: For materials that will be salvaged and reused in this Project, describe methods for preparing salvaged materials before incorporation into the Work.
      b. Salvaged materials for sale: For materials that will be sold to individuals and organizations, include list of their names, addresses, and telephone numbers.
      c. Salvaged materials for donation: For materials that will be donated to individuals and organizations, include list of their names, addresses, and telephone numbers.
      d. Recycled materials: Include list of local receivers and processors and type of recycled materials each will accept. Include names, addresses, and telephone numbers.
      e. Disposed materials: Indicate how and where materials will be disposed of. Include name, address, and telephone number of each landfill and incinerator facility.
      f. Handling and transportation procedures: Include method that will be used for separating recyclable waste including sizes of containers, container labeling, and designated location where materials separation will be performed.

D. Cost/Revenue Analysis:
   1. Indicate total cost of waste disposal as if there was no waste management plan and net additional cost or net savings resulting from implementing waste management plan. Use Form CWM-5 for construction waste and Form CWM-6 for demolition waste. Include the following:
      a. Total quantity of waste.
      b. Estimated cost of disposal (cost per unit). Include hauling and tipping fees and cost of collection containers for each type of waste.
      c. Total cost of disposal (with no waste management).
      d. Revenue from salvaged materials.

e. Revenue from recycled materials.
f. Savings in hauling and tipping fees by donating materials.
g. Savings in hauling and tipping fees that are avoided.
h. Handling and transportation costs. Include cost of collection containers for each type of waste.
i. Net additional cost or net savings from waste management plan.

PART 2 PRODUCTS (NOT USED)

PART 3 EXECUTION

3.1 PLAN IMPLEMENTATION

A. Implement approved waste management plan. Provide handling, containers, storage, signage, transportation, and other items as required to implement waste management plan during the entire duration of the Contract:
   1. Comply with operation, termination, and removal requirements in Section 01 50 00: Temporary Facilities and Controls.

B. Waste Management Coordinator: Engage a waste management coordinator to be responsible for implementing, monitoring, and reporting status of waste management work plan.

C. Training:
   1. Train workers, subcontractors, and suppliers on proper waste management procedures, as appropriate for the Work:
      a. Distribute waste management plan to everyone concerned within three (3) days of submittal return.
      b. Distribute waste management plan to entities when they first begin work onsite. Review plan procedures and locations established for salvage, recycling, and disposal.

D. Site Access and Temporary Controls:
   1. Conduct waste management operations to ensure minimum interference with roads, streets, walks, walkways, and other adjacent occupied and used facilities:
      a. Designate and label specific areas on Project site necessary for separating materials that are to be salvaged, recycled, reused, donated, and sold.
      b. Comply with Section 01 50 00: Temporary Facilities and Controls for the control of dust and dirt, environmental protection, and noise control.

E. Waste Management in Historic Zones or Areas: Hauling equipment and other materials shall be of sizes that clear surfaces within historic spaces, areas, rooms, and openings, by 12 inches (300 mm) or more.

3.2 SALVAGING DEMOLITION WASTE

A. Salvaged Items for Reuse in the Work:
   1. Salvage items for reuse and handle:
      a. Clean salvaged items.
      b. Pack or crate items after cleaning. Identify contents of containers with label indicating elements, date of removal, quantity, and location where removed.
      c. Store items in a secure area until installation.
      d. Protect items from damage during transport and storage.
      e. Install salvaged items to comply with installation requirements for new materials

and equipment. Provide connections, supports, and miscellaneous materials necessary to make items functional for use indicated.

B. Salvaged Items for Sale and Donation: Not permitted on Project site.

C. Salvaged Items for Owner's Use:
1. Salvage items for Owner's use and handle as follows:
   a. Clean salvaged items.
   b. Pack or crate items after cleaning. Identify contents of containers with label indicating elements, date of removal, quantity, and location where removed.
   c. Store items in a secure area until delivery to Owner.
   d. Transport items to Owner's storage area designated by Owner.
   e. Protect items from damage during transport and storage.

D. Doors and Hardware: Brace open end of door frames. Except for removing door closers, leave door hardware attached to doors, unless otherwise designated by Owner.

E. Equipment: Drain tanks, piping, and fixtures. Seal openings with caps or plugs. Protect equipment from exposure to weather.

F. Plumbing Fixtures: Separate by type and size.

G. Lighting Fixtures: Separate lamps by type and protect from breakage.

H. Electrical Devices: Separate switches, receptacles, switchgear, transformers, meters, panelboards, circuit breakers, and other devices by type.

3.3 RECYCLING WASTE

A. Recycle paper and beverage containers used by onsite workers.

B. Recycling Incentives: Revenues, savings, rebates, tax credits, and other incentives received for recycling waste materials shall accrue to Owner.

C. Preparation of Waste: Prepare and maintain recyclable waste materials according to recycling or reuse facility requirements. Maintain materials free of dirt, adhesives, solvents, petroleum contamination, and other substances deleterious to the recycling process.

D. Procedures:
1. Separate recyclable waste from other waste materials, trash, and debris. Separate recyclable waste by type at Project site to the maximum extent practical according to approved construction waste management plan:
   a. Provide appropriately marked containers or bins for controlling recyclable waste until removed from Project site. Include list of acceptable and unacceptable materials at each container and bin:
      1) Inspect containers and bins for contamination and remove contaminated materials if found.
   b. Stockpile processed materials onsite without intermixing with other materials. Place, grade, and shape stockpiles to drain surface water. Cover to prevent windblown dust.
   c. Stockpile materials away from construction area. Do not store within drip line of remaining trees.
   d. Store components off the ground and protect from the weather.
   e. Remove recyclable waste from Owner's property and transport to recycling receiver or processor.

3.4 DISPOSAL OF WASTE

A. Except for items or materials to be salvaged, recycled, or otherwise reused, remove waste materials from Project site and legally dispose of them in a landfill or incinerator acceptable to authorities having jurisdiction:
   1. Except as otherwise specified, do not allow waste materials that are to be disposed of to accumulate onsite.
   2. Remove and transport debris in a manner that will prevent spillage on adjacent surfaces and areas.

B. Burning:
   1. Do not burn waste materials:
      a. Burning of waste materials is permitted only at designated areas on Owner's property, provided required permits are obtained. Provide full-time monitoring for burning materials until fires are extinguished.

C. Disposal: Remove waste materials and dispose of at designated spoil areas on Owner's property.

3.5 ATTACHMENTS

A. Form CWM-1 for construction waste identification.

B. Form CWM-2 for demolition waste identification.

C. Form CWM-3 for construction waste reduction work plan.

D. Form CWM-4 for demolition waste reduction work plan.

E. Form CWM-5 cost/revenue analysis of construction waste reduction work plan.

F. Form CWM-6 cost/revenue analysis of demolition waste reduction work plan.

G. Form CWM-7 for construction waste

H. Form CWM-8 for demolition waste.

CWM FORMS ON FOLLOWING PAGES

FORM CWM-1: CONSTRUCTION WASTE IDENTIFICATION							
MATERIAL CATEGORY	**GENERATION POINT**	**EST. QUANTITY OF MATERIALS RECEIVED* (A)**	**EST. WASTE - % (B)**	**TOTAL EST. QUANTITY OF WASTE* (C = A x B)**	**EST. VOLUME CY (CM)**	**EST. WEIGHT TONS (TONNES)**	**REMARKS AND ASSUMPTIONS**
Packaging: Cardboard							
Packaging: Boxes							
Packaging: Plastic Sheet or Film							
Packaging: Polystyrene							
Packaging: Pallets or Skids							
Packaging: Crates							
Packaging: Paint Cans							
Packaging: Plastic Pails							
Site-Clearing Waste							
Masonry or CMU							
Lumber: Cut-Offs							
Lumber: Warped Pieces							
Plywood or OSB (scraps)							
Wood Forms							
Wood Waste Chutes							
Wood Trim (cut-offs)							
Metals							
Insulation							
Roofing							
Joint Sealant Tubes							
Gypsum Board (scraps)							
Carpet and Pad (scraps)							
Piping							
Electrical Conduit							
Other:							

FORM CWM-2: DEMOLITION WASTE IDENTIFICATION				
MATERIAL DESCRIPTION	**EST. QUANTITY**	**EST. VOLUME CY (CM)**	**EST. WEIGHT TONS (TONNES)**	**REMARKS AND ASSUMPTIONS**
Asphaltic Concrete Paving				
Concrete				
Brick				
CMU				
Lumber				
Plywood and OSB				
Wood Paneling				
Wood Trim				
Miscellaneous Metals				
Structural Steel				
Rough Hardware				
Insulation				
Roofing				
Doors and Frames				
Door Hardware				
Windows				
Glazing				
Acoustical Tile				
Carpet				
Carpet Pad				
Demountable Partitions				
Equipment				
Cabinets				
Plumbing Fixtures				
Piping				
Piping Supports and Hangers				
Valves				
Sprinklers				
Mechanical Equipment				
Electrical Conduit				
Copper Wiring				
Light Fixtures				
Lamps				
Lighting Ballasts				
Electrical Devices				
Switchgear and Panelboards				
Transformers				
Other:				

FORM CWM-3: CONSTRUCTION WASTE REDUCTION WORK PLAN						
MATERIAL CATEGORY	GENERATION POINT	TOTAL EST. QUANTITY OF WASTE TONS (TONNES)	DISPOSAL METHOD AND QUANTITY			HANDLING AND TRANSPORTION PROCEDURES
			EST. AMOUNT SALVAGED TONS (TONNES)	EST. AMOUNT RECYCLED TONS (TONNES)	EST. AMOUNT DISPOSED TO LANDFILL TONS (TONNES)	
Packaging: Cardboard						
Packaging: Boxes						
Packaging: Plastic Sheet or Film						
Packaging: Polystyrene						
Packaging: Pallets or Skids						
Packaging: Crates						
Packaging: Paint Cans						
Packaging: Plastic Pails						
Site-Clearing Waste						
Masonry or CMU						
Lumber: Cut-Offs						
Lumber: Warped Pieces						
Plywood or OSB (scraps)						
Wood Forms						
Wood Waste Chutes						
Wood Trim (cut-offs)						
Metals						
Insulation						
Roofing						
Joint Sealant Tubes						
Gypsum Board (scraps)						
Carpet and Pad (scraps)						
Piping						
Electrical Conduit						
Other:						

FORM CWM-4: DEMOLITION WASTE REDUCTION WORK PLAN						
			DISPOSAL METHOD AND QUANTITY			
MATERIAL CATEGORY	GENERATION POINT	TOTAL EST. QUANTITY OF WASTE TONS (TONNES)	EST. AMOUNT SALVAGED TONS (TONNES)	EST. AMOUNT RECYCLED TONS (TONNES)	EST. AMOUNT DISPOSED TO LANDFILL TONS (TONNES)	HANDLING AND TRANSPORTION PROCEDURES
Asphaltic Concrete Paving						
Concrete						
Brick						
CMU						
Lumber						
Plywood and OSB						
Wood Paneling						
Wood Trim						
Miscellaneous Metals						
Structural Steel						
Rough Hardware						
Insulation						
Roofing						
Doors and Frames						
Door Hardware						
Windows						
Glazing						
Acoustical Tile						
Carpet						
Carpet Pad						
Demountable Partitions						
Equipment						
Cabinets						
Plumbing Fixtures						
Piping						
Supports and Hangers						
Valves						
Sprinklers						
Mechanical Equipment						
Electrical Conduit						
Copper Wiring						
Light Fixtures						
Lamps						
Lighting Ballasts						
Electrical Devices						
Switchgear and Panelboards						
Transformers						
Other:						

FORM CWM-5: COST/REVENUE ANALYSIS OF CONSTRUCTION WASTE REDUCTION WORK PLAN

MATERIALS	TOTAL QUANTITY OF MATERIALS (VOL. OR WEIGHT) (A)	EST. COST OF DISPOSAL (B)	TOTAL EST. COST OF DISPOSAL (C = A x B)	REVENUE FROM SALVAGED MATERIALS (D)	REVENUE FROM RECYCLED MATERIALS (E)	LANDFILL TIPPING FEES AVOIDED (F)	HANDLING AND TRANSPORTATION COSTS AVOIDED (G)	NET COST SAVINGS OF WORK PLAN (H = D+E+F+G)
Packaging: Cardboard								
Packaging: Boxes								
Packaging: Plastic Sheet or Film								
Packaging: Polystyrene								
Packaging: Pallets or Skids								
Packaging: Crates								
Packaging: Paint Cans								
Packaging: Plastic Pails								
Site-Clearing Waste								
Masonry or CMU								
Lumber: Cut-Offs								
Lumber: Warped Pieces								
Plywood or OSB (scraps)								
Wood Forms								
Wood Waste Chutes								
Wood Trim (cut-offs)								
Metals								
Insulation								
Roofing								
Joint Sealant Tubes								
Gypsum Board (scraps)								
Carpet and Pad (scraps)								
Piping								
Electrical Conduit								
Other:								

FORM CWM-6: COST/REVENUE ANALYSIS OF DEMOLITION WASTE REDUCTION WORK PLAN

MATERIALS	TOTAL QUANTITY OF MATERIALS (VOL. OR WEIGHT) (A)	EST. COST OF DISPOSAL (B)	TOTAL EST. COST OF DISPOSAL (C = A x B)	REVENUE FROM SALVAGED MATERIALS (D)	REVENUE FROM RECYCLED MATERIALS (E)	LANDFILL TIPPING FEES AVOIDED (F)	HANDLING AND TRANSPORTATION COSTS AVOIDED (G)	NET COST SAVINGS OF WORK PLAN (H = D+E+F+G)
Asphaltic Concrete Paving								
Concrete								
Brick								
CMU								
Lumber								
Plywood and OSB								
Wood Paneling								
Wood Trim								
Miscellaneous Metals								
Structural Steel								
Rough Hardware								
Insulation								
Roofing								
Doors and Frames								
Door Hardware								
Windows								
Glazing								
Acoustical Tile								
Carpet								
Carpet Pad								
Demountable Partitions								
Equipment								
Cabinets								
Plumbing Fixtures								
Piping								
Supports and Hangers								
Valves								
Sprinklers								
Mech. Equipment								
Electrical Conduit								
Copper Wiring								
Light Fixtures								
Lamps								
Lighting Ballasts								
Electrical Devices								
Switchgear and Panelboards								
Transformers								
Other:								

FORM CWM-7: CONSTRUCTION WASTE REDUCTION PROGRESS REPORT

MATERIAL CATEGORY	GENERATION POINT	TOTAL QUANTITY OF WASTE TONS (TONNES) (A)	QUANTITY OF WASTE SALVAGED		QUANTITY OF WASTE RECYCLED		TOTAL QUANTITY OF WASTE RECOVERED TONS (TONNES) (D = B + C)	TOTAL QUANTITY OF WASTE RECOVERED % (D / A x 100)
			ESTIMATED TONS (TONNES)	ACTUAL TONS (TONNES) (B)	ESTIMATED TONS (TONNES)	ACTUAL TONS (TONNES) (C)		
Packaging: Cardboard								
Packaging: Boxes								
Packaging: Plastic Sheet or Film								
Packaging: Polystyrene								
Packaging: Pallets or Skids								
Packaging: Crates								
Packaging: Paint Cans								
Packaging: Plastic Pails								
Site-Clearing Waste								
Masonry or CMU								
Lumber: Cut-Offs								
Lumber: Warped Pieces								
Plywood or OSB (scraps)								
Wood Forms								
Wood Waste Chutes								
Wood Trim (cut-offs)								
Metals								
Insulation								
Roofing								
Joint Sealant Tubes								
Gypsum Board (scraps)								
Carpet and Pad (scraps)								
Piping								
Electrical Conduit								
Other:								

FORM CWM-8: DEMOLITION WASTE REDUCTION PROGRESS REPORT

MATERIAL CATEGORY	GENERATION POINT	TOTAL QUANTITY OF WASTE TONS (TONNES) (A)	QUANTITY OF WASTE SALVAGED		QUANTITY OF WASTE RECYCLED		TOTAL QUANTITY OF WASTE RECOVERED TONS (TONNES) (D = B + C)	TOTAL QUANTITY OF WASTE RECOVERED % (D / A x 100)
			ESTIMATED TONS (TONNES)	ACTUAL TONS (TONNES) (B)	ESTIMATED TONS (TONNES)	ACTUAL TONS (TONNES) (C)		
Asphaltic Concrete Paving								
Concrete								
Brick								
CMU								
Lumber								
Plywood and OSB								
Wood Paneling								
Wood Trim								
Miscellaneous Metals								
Structural Steel								
Rough Hardware								
Insulation								
Roofing								
Doors and Frames								
Door Hardware								
Windows								
Glazing								
Acoustical Tile								
Carpet								
Carpet Pad								
Demountable Partitions								
Equipment								
Cabinets								
Plumbing Fixtures								
Piping								
Supports and Hangers								
Valves								
Sprinklers								
Mechanical Equipment								
Electrical Conduit								
Copper Wiring								
Light Fixtures								
Lamps								
Lighting Ballasts								
Electrical Devices								
Switchgear and Panelboards								
Transformers								
Other:								

END OF SECTION 01 74 19

SECTION 01 77 00 CLOSEOUT PROCEDURES

PART 1 GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 01 Specification Sections, apply to this Section.

1.2 PRE-CLOSEOUT MEETING

A. Pre-Closeout Meeting: Schedule and convene a pre-closeout meeting with Owner and Architect in accordance with Section 01 31 00: Project Management and Coordination.

1.3 SUBSTANTIAL COMPLETION

A. The items identified in the Contract Documents, including the Supplementary Conditions and the following items shall be completed before Substantial Completion will be granted (also see Section 01 77 22: Substantial Completion Procedures):
   1. Contractor's completion list (punch list): Submit a thorough list of items to be completed or corrected, along with a written request for Substantial Completion and for review of the Work or portion of the Work. Architect's or Engineer's Project representative, at their discretion, may attend and assist in the preparation of Contractor's punch list.
   2. Architect's supplemental punch list: Architect/Engineer, along with Owner at Owner's discretion, will inspect the Work utilizing Contractor's prepared punch list, noting completed items and incomplete items, and will prepare a supplemental list of items that have been omitted or incomplete items that were not previously noted.
   3. Operations and maintenance manuals: Submit as described.
   4. Final cleaning: Provide final cleaning and adequate protection of installed construction as described.
   5. Starting of systems: Start up equipment and systems as described.
   6. Testing and balancing: Testing and balancing of systems must be performed and completed by Owner's forces, and the report submitted and accepted by Architect/Engineer and Owner, as described in the Contract Documents. Make adjustments to equipment as required to achieve acceptance.
   7. Demonstrations: If required by individual Specification Sections or by Owner, provide demonstrations and instructions for use of equipment as described.

B. Date of Substantial Completion: Complete or correct items identified on punch list and confirm that all items have been corrected prior to Architect's re-inspection. Architect/Engineer, along with Owner, will re-inspect the corrected work to establish the Date of Substantial Completion. Incomplete items remaining will be appended to the Certificate of Substantial Completion (AIA G704). The Date of Substantial Completion represents day one of the closeout period and represents the date of commencement of Contractor's correctional period and all warranty periods as described and required by the Contract Documents, except as amended in the Certificate of Substantial Completion and elsewhere in the Contract Documents.

C. Certificate of Substantial Completion: When the Work or designated portion thereof is substantially complete, Architect will prepare the Certificate of Substantial Completion to be executed by Owner and Contractor. Items on the appended punch list shall be completed or corrected within the time limits established in the Certificate.

1.4 PUNCH LIST

A. A comprehensive list prepared by Contractor prior to Substantial Completion, and attached thereto, to establish all items to be corrected, or limited items of work to be completed, if any. This list is intended to represent a limited number of items needing attention.

B. Punch lists shall be furnished to Architect in Microsoft Excel and PDF formats. The punch list shall be in matrix form and shall include the following information for each punch list item:
   1. Room number or other suitable location identifier.
   2. Description of the Work.
   3. Subcontractor/trade sign-off that the work has been verified to be 100 percent complete and in accordance with the Contract Documents.
   4. Subcontractor/trade sign-off date.
   5. General Contractor sign-off that the work has been verified to be 100 percent complete and in accordance with the Contract Documents.
   6. General Contractor/trade sign-off date.
   7. A/E consultant sign-off.
   8. A/E consultant sign-off date.
   9. If requested by Owner, provide two (2) additional similar columns for their sign-off.
   10. In the case of excessive repetition of the same item at various locations, the punch list may contain "general notes/items" that shall be applied to the entire Project. It shall be the responsibility of the Contractor/Subcontractor to thoroughly examine the entire Project and make corrective measures at all applicable locations.

C. Should Architect determine that Contractor's punch list lacks sufficient detail or requires extensive supplementation, the punch list will be returned to Contractor for re-inspection and revision. The date of Substantial Completion will be delayed until the punch list submitted is a reasonable representation of the Work to be done.

D. A significantly large number of items to be completed or corrected will preclude Architect from issuing a Certificate of Substantial Completion. Owner and Architect will be the sole judges of what constitutes a significantly large number of items. It is anticipated that the detailed list of items of Work to be completed or corrected at the Date of Substantial Completion will be no longer than five (5) typed pages.

E. Contractor's superintendent shall participate in the preparation of Contractor's punch list that is submitted to Architect and Owner for supplementation. Upon receipt, Architect and consultants shall perform a spot review to determine the adequacy and completeness of Contractor's punch list.

F. Upon receipt of an acceptable Contractor's punch list, Contractor's superintendent shall accompany Architect, his consultants and Owner (at his discretion) during their observation and the preparation of their supplements to Contractor's punch list:
   1. The superintendent shall record or otherwise take note of all supplementary items.
   2. Architect will endeavor to furnish to Contractor typed, hand written, or recorded supplements to the punch list in a prompt manner; however, any delay in Contractor receiving said supplements from Architect will not be cause for a claim for additional cost or extension of time as Contractor's superintendent shall have been in attendance during the inspections of Architect and his consultants and will have been expected to take his own notes.

1.5 OPERATIONS AND MAINTENANCE MANUAL

A. As a requirement for Substantial Completion, the final operation and maintenance manual shall be submitted to, and reviewed and accepted by Architect prior to issuance of the

Certificate.

B. Prepare a 3-ring D-slant binder cover and spline with printed title "OPERATIONS AND MAINTENANCE MANUAL," title of Project, and subject matter of binder when multiple binders are required.

C. Submit one (1) copy of preliminary operations and maintenance manuals to respective consultants (civil, MEP, structural, etc.) for review of conformance with Contract requirements prior to submitting final to Architect. Allow time for proper review.

D. Internally subdivide binder contents with permanent page dividers, logically organized as described below; with tab titling clearly printed under reinforced laminated plastic tabs.

E. Drawings: Provide with reinforced punched binder tab. Bind in with text; fold larger drawings to size of text pages.

F. Contents:
   1. Prepare Table of Contents for each volume, with each product or system description identified, typed on white paper, in three parts as follows:
      a. Part 1: Directory, listing names, addresses, and telephone numbers of Architect/Engineer, Contractor, subcontractors, and major equipment suppliers.
      b. Part 2: Operation and Maintenance, arranged by system and subdivided by Specification Section. For each category, identify names, addresses, and telephone numbers of subcontractors and suppliers. Identify the following:
         1) Significant design criteria.
         2) List of equipment.
         3) Parts list for each component.
         4) Equipment start-up instructions
         5) Operating instructions.
         6) Maintenance instructions for equipment and systems.
         7) Maintenance instructions for finishes, including recommended cleaning methods and materials, and special precautions identifying detrimental agents.
      c. Part 3: Project documents and certificates, including the following:
         1) Product data.
         2) Air and water balance reports.
         3) Photocopies of warranties, certificates and bonds. Submit originals with Closeout Documents as specified below.

G. Submit one (1) final original and two (2) copies to Architect.

H. Contractor shall provide a DVD, in PDF Format, the following documents after approval by Architect, consultants, and Owner: Closeout Manual, MSDS binder, O&M Manuals, Specifications and approved submittals. Documents shall be hyperlinked to the Table of Contents.

1.6 PROJECT CLOSEOUT

A. Final Payment will not be authorized by Architect until Architect finds the Work acceptable under the Contract Documents, subject to the completion and acceptance of the following requirements and other applicable Contract requirements:
   1. Close-out Documents: Provide bound closeout documents as described. Refer to the Supplementary Conditions for additional information.
   2. Record Documents: Submit as described.
   3. Extra materials: Provide extra stock, materials, and products as described when

required by individual Specification Sections.
4. Locks: Make final changeover of permanent locks and transmit keys to Owner. Advise Owner's personnel of changeover in security provisions.
5. Temporary Facilities: Discontinue and remove temporary facilities from the site, along with mockups, construction aids, and similar elements.
6. Warranties, Certificates and Bonds: Execute and assemble transferable warranty documents, certificates, and bonds from subcontractors, suppliers, and manufacturers as described.
7. Final Inspection and Acceptance by Architect is achieved as described.

1.7 CLOSEOUT DOCUMENTS

A. Coordinate the following items with the requirements of Document CB, Supplementary Conditions of the Contract.

B. Prepare 3-ring D-slant binder cover and spline with printed title "CLOSEOUT DOCUMENTS", title of Project, and subject matter of binder when multiple binders are required. Submit one (1) original and two (2) copies.

C. Internally subdivide binder contents with permanent page dividers, logically organized as described below; with tab titling clearly printed under reinforced laminated plastic tabs.

D. The closeout documents shall be neatly organized and easily useable as determined by Architect and Owner. Separate closeout document binders from operations and maintenance manuals. Documents identified as "affidavit" shall be notarized.

E. Prepare a table of contents for each volume, with each item description identified, typed on white paper, in five (5) parts as follows:
1. Part 1: Directory listing names, addresses, and telephone numbers of Architect/Engineer, Contractor, subcontractors, and major equipment suppliers. All General Contractor's vendors/suppliers and subcontractors that provided materials or performed any work related to this Project must be listed on this form. Submit final list of subcontractors on Document AD.
2. Part 2: Closeout documents and affidavits, including the following:
   a. AIA G707 - Consent of Surety to Final Payment.
   b. AIA G706 - Contractor's Affidavit of Payment of Debts and Claims.
   c. AIA G706A - Contractor's Affidavit of Release of Liens.
3. Part 3: Project documents and certificates, including the following:
   a. Copy of Certificate of Substantial Completion (AIA G704).
   b. Copy of All Permits.
   c. Copy of Final Utility Bill or letter of transfer.
   d. Copy of Certificate of Occupancy.
   e. Copy of Certification of Project Compliance: Submit on attached **Closeout Form "B"**. Owner and Architect will initiate form and forward to Contractor for signature once Substantial Completion is established (Owner to be provided original separately).
4. Part 4: Warranties and Release of Liens; compile sequentially based on Specification Sections:
   a. General Contractor's warranty: Submit on company letterhead as described below. This Warranty shall state all sections of Work performed by General Contractor's own forces, and warranty period for each section of Work.
   b. Subcontractor's release of lien: Include Contractor's, Subcontractor's, and direct material and equipment supplier's separate final releases. Submit on attached **Closeout Form "A"** – Subcontractor's Affidavit of Release of Lien.
   c. Hazardous material certificate: Submit on attached **Closeout Form "C"**. Affidavits from Contractor, subcontractors and General Contractor's vendors or suppliers

stating that no hazardous materials/products have been used or installed in this Project.

d. Subcontractor's warranty: Notarized and submitted on attached **Closeout Form "D"**. This warranty shall state all sections of Work performed by the Subcontractor and warranty period.
e. Special/extended warranties: List and provide notarized warranties requested by Owner, or required by or incorporated in the Contract Documents.
f. Spreadsheet depicting all items and materials that carry a warranty longer than one (1) year. Include information consisting of material/supplier/installer/Specification Section/length of warranty and contact information.

5. Part 5: Receipts:
   a. Extra stock: Provide original receipts for delivery of "extra stock" items as described below. Receipts must be signed by an authorized Owner's representative.
   b. Keys: Provide original receipts for delivery of "keys." Receipts must be signed by an authorized Owner's representative.
   c. Sign-in sheets: Provide signatures of attendees from all demonstrations.

F. In addition to the three (3) required closeout binders listed above, provide Architect with one (1) separate binder for their records containing the following:
   1. Directory listing names, addresses, and telephone numbers of Architect/Engineer, Contractor, subcontractors, and major equipment suppliers.
   2. All MSDS sheets for the Project.
   3. All warranties from Contractor, subcontractors, direct suppliers, and manufacturers.

G. Failure to complete and closeout Project after substantial completion may result in liquidated damages being assessed to Contractor. Refer to Conditions of the Contract for additional requirements and liquidated damages.

1.8 FINAL CLEANING

A. Execute final cleaning prior to final Project inspection and acceptance.

B. Clean interior and exterior glass, and surfaces exposed to view; remove temporary labels, stains and foreign substances, polish transparent and glossy surfaces, vacuum carpeted and soft surfaces, mop hard floor surfaces.

C. Remove smudges, marks, stains, fingerprints, soil, dirt, spots, dust, lint, and other foreign materials from finished and exposed surfaces

D. Clean equipment and fixtures to sanitary condition with cleaning materials appropriate to surface and material being cleaned.

E. Clean and replace filters of operating equipment as required by Contract Documents

F. Clean debris from roofs, gutters, downspouts, and drainage systems.

G. Clean site; sweep paved areas, rake clean landscaped surfaces.

H. Remove waste and surplus materials, rubbish, and temporary construction facilities from site.

1.9 PROTECTING INSTALLED CONSTRUCTION

A. Protect installed Work and provide special protection where specified in individual

Specification Sections until Work is accepted by Architect and Owner.

B. Provide temporary and removable protection for installed products. Control activity in immediate work area to prevent damage.

C. Provide protective coverings at walls, projections, jambs, sills, and soffits of openings.

D. Protect finished floors, stairs, and other surfaces from traffic, dirt, wear, damage, or movement of heavy objects, by protecting with durable sheet materials.

E. Prohibit traffic or storage upon waterproofed or roofed surfaces. When traffic or activity is necessary, obtain recommendations for protection from waterproofing or roofing material manufacturer.

F. Prohibit traffic from landscaped areas.

1.10 STARTING OF SYSTEMS

A. Coordinate schedule for start-up of various equipment and systems.

B. Notify Architect/Engineer and Owner 48 hours prior to start-up of each item.

C. Verify each piece of equipment or system has been checked for proper lubrication, drive rotation, belt tension, control sequence, and for conditions which may cause damage.

D. Verify tests, meter readings, and specified electrical characteristics agree with those required by equipment or system manufacturer.

E. Verify wiring and support components for equipment are complete and tested.

F. Execute start-up under supervision of Contractors' personnel, and installer in accordance with manufacturers' instructions.

G. When specified in individual Specification Sections or required by manufacturer, require manufacturer to provide authorized representative to be present at site to inspect, check, and approve equipment or system installation prior to start-up, and to supervise placing equipment or system in operation.

H. When specified in individual Specification Sections or required by Owner or Architect/Engineer, submit a written report in accordance with Section 01 33 00, Submittal Procedures, that equipment or system has been properly installed and is functioning correctly.

1.11 DEMONSTRATION AND INSTRUCTIONS

A. Demonstrate operation and maintenance of products to Owner's personnel a minimum of 48 hours prior to date of Final Completion in accordance with Owner’s requirements.

B. Demonstrate Project equipment instructed by qualified manufacturer's representative who is knowledgeable about the Project and equipment.

C. For equipment or systems requiring seasonal operation, perform demonstration for other season within six (6) months.

D. Utilize maintenance manual as basis for instruction. Review contents of manual with

Owner's personnel to explain all aspects of operation and maintenance.

E. Demonstrate start-up, operation, control, adjustment, trouble-shooting, servicing, maintenance, and shutdown of each item of equipment.

F. Prepare and insert additional data in maintenance manuals when needed for when additional data becomes apparent during instruction.

G. Review and verify proper start-up and operation of equipment prior to scheduling demonstrations with Owner.

H. All demonstrations are to be documented by video and submitted to Owner in DVD format along with the closeout documents. General Contractor is responsible for all video and compilation onto DVD with linked menus.

1.12 PROJECT RECORD DOCUMENTS

A. Project Record Documents, as described in Section 01 78 39: Project Record Documents, shall be submitted at Project closeout. Final payment will not be authorized by Architect until final review and acceptance by Architect and Engineers is achieved in accordance with Owner's requirements.

B. At Contractor's request, and with associated fee, Architect may provide electronic versions of the construction Drawing and Specification files for Contractor's use, subject to the terms and conditions of Architect's standard electronic document transfer agreement.

C. Submit reproducibles to respective consultants (civil, structural, MEP, etc.) for review. Consultant will mark-up corrections and return to Contractor for final revisions. Make final revisions prior to submitting to Architect:
   1. Format: One (1) set of film positive reproducibles and two (2) sets of bluelines of approved reproducibles.
   2. Provide Owner with one (1) set of Record Drawings on a non-rewritable CD in AutoCAD® latest release.
   3. Provide Owner with one (1) set of Record Drawings on a non-rewritable CD in PDF format.
   4. Label electronic CAD files and PDF files in the same manner as the sheets (example, A2.02 First Floor Area 'A', etc.)

1.13 EXTRA STOCK, MATERIALS, AND MAINTENANCE PRODUCTS

A. Furnish extra stock, maintenance, and extra products in quantities specified in individual Specification Sections.

B. Deliver to Project site or to District Maintenance Department as directed by Owner; obtain signed receipt from Owner's authorized representative prior to final application for payment. Delivery of materials to, or obtaining receipt from anyone other than Owner's authorized representative may constitute breach of this requirement and may require delivery of additional materials at no cost to Owner if original materials are misplaced.

C. Include signed receipts for delivery of extra stock and materials, including keys, with closeout documents.

1.14 WARRANTIES, CERTIFICATES, AND BONDS

A. Definitions:

1. Standard product warranties: Preprinted written warranties published by individual manufacturers for particular products and are specifically endorsed by the manufacturer to Owner.
2. Special warranties: Written warranties required by or incorporated in the Contract Documents, either to extend time limits provided by standard warranties or to provide coverage of specific defects, or both.

B. In accordance with the general warranty obligations under the General Conditions as amended by the Supplementary Conditions, General Contractor's warranty shall be for a period of one (1) year following the date of Substantial Completion, hereinafter called the one-year warranty period. Contractor’s one (1) year general warranty shall include all labor, material, and delivery costs required to correct defective material and installation. This warranty shall not limit Owner’s rights with respect to latent defects, gross mistakes, or fraud.

C. Contractor’s one (1) year warranty shall run concurrently with the one (1) year period for correction of Work required in the General Conditions.

D. No service charges or call out charges are allowed to investigate warranty claims.

E. In addition to Contractor’s one (1) year warranty, special warranties, as described in individual Specifications Sections, shall extend the warranty period for the period specified without limitation in respect to other obligations for which Contractor has under the Contract Documents.

F. Manufacturer’s disclaimers and limitations on product warranties do not relieve Contractor of the warranty on the Work that incorporates the products, nor does it relieve the suppliers, manufacturers, and subcontractors required to countersign special warranties with Contractor.

G. Warranty Requirements:
1. When correcting warranted Work that has failed, remove and replace other Work that has been damaged as a result of such failure or that must be removed and replaced to provide access for correction of warranted Work.
2. When Work covered by a warranty has failed and been corrected by replacement or reconstruction, reinstate the warranty by written endorsement. The reinstated warranty shall be equal to the original warranty with an equitable adjustment for depreciation.
3. Upon determination that Work covered by a warranty has failed, replace or rebuild the Work to an acceptable condition complying with requirements of Contract Documents. Contractor is responsible for the cost of replacing defective Work regardless of whether Owner has benefited from use of the Work through a portion of its anticipated useful service life.
4. Written warranties made to Owner are in addition to implied warranties, and shall not limit the duties, obligations, rights, and remedies otherwise available under the law, nor shall warranty periods be interpreted as limitations on time in which Owner can enforce such other duties, obligations, rights, or remedies.
5. Owner reserves the right to refuse to accept Work for the Project where a special warranty, certification, or similar commitment is required on such Work or designated portion of the Work, until evidence is presented that entities required to countersign such commitments are willing to do so.

H. Compile copies of each required warranty properly executed by Contractor and the Subcontractor, supplier, or manufacturer. Verify documents are in proper form, contain full information, and are notarized. Co-execute warranties, certificates, and bonds when required and include signed warrantees with Closeout Documents submitted to Architect.

1.15 FINAL COMPLETION AND FINAL PAYMENT

A. Final Notice and Inspection:
   1. When all items on the punch list have been corrected, final cleaning has been completed, and installed work has been protected, submit written notice to Architect that the Work is ready for final inspection and acceptance.
   2. Upon receipt of written notice that the Work is ready for final inspection and acceptance, Architect and Engineer will make final inspection.

B. Final Change Order: When the Project closeout items described above are successfully completed and the Work is found acceptable to Architect/Engineer and Owner, a Final Change Order will be executed. This Change Order will include any Allowance adjustments as required by the Contract Documents.

C. Final Application for Payment: When all of the above items are successfully complete, submit to Architect a final Application for Payment and request for release of retainage.

D. Release of Retainage: Release of retainage will not be authorized by Architect until Contractor completes all requirements for closeout to the satisfaction of Owner and Architect as described herein.

1.16 TERMINAL INSPECTION

A. Immediately prior to expiration of the one (1) year period for correction of the Work, Contractor shall make an inspection of the Work in the company of Architect and Owner. Architect and Owner shall be given not less than ten (10) days' notice prior to the anticipated date of terminal inspection.

B. Where any portion of the work has proven to be defective and requires replacement, repair, or adjustment, Contractor shall immediately provide materials and labor necessary to remedy such defective work and shall execute such work without delay until completed to the satisfaction of Architect and Owner, even if the date of completion of the corrective work may extend beyond the expiration date of the correction period.

C. Contractor shall not be responsible for correction of Work that has been damaged because of neglect or abuse by Owner, nor the replacement of parts necessitated by normal wear in use.

PART 2 PRODUCTS (NOT USED)

PART 3 EXECUTION (NOT USED)

END OF SECTION 01 77 00

CLOSE-OUT FORM "A"

SUBCONTRACTOR'S AFFIDAVIT OF RELEASE OF LIEN

STATE OF CALIFORNIA COUNTY OF _____

KNOW ALL MEN BY THESE PRESENTS:

_____, being first duly sworn, deposes and says:

1. That he / she is the _____ of _____, the subcontractor who supplied, installed, and /or erected the Work described below, and that, he /she is duly authorized to make this Affidavit and Subcontractor Release:

   Project: Name

   Owner: Independent School District Architect: ___PBK_____

   Work Performed: _____Specification Section(s): _____

2. That all Work required under the subject subcontractor of the subject construction project has been performed in accordance with the terms thereof, that all material men, sub-subcontractors, mechanics, and laborers have been paid and satisfied in full and that there are no outstanding claims of any character arising out of the performance of said subcontractor which have not been paid and satisfied in full.

3. That to the best of his / her knowledge and belief, there are no unsatisfied claims for damages resulting from injury or death to any employees, sub-subcontractors, or the public at large arising out of the performance of said subcontract, or any suits or claims for any other damages of any kind, nature, or description which might constitute a lien upon the property of the Owner.

4. That he / she has received full payment of all sums due him / her for materials furnished and services rendered by the undersigned in connection with the performance of said subcontract and has and does hereby release the Owner and the Architect and his consultants and the Contractor from any and all claims of any character arising out of or in any way connected with performance of said subcontract.

ATTEST (If Corporation) _____
Name of Subcontractor

_____ _____
Secretary (By) (Title)

STATE OF _____

COUNTY OF _____

Sworn to and subscribed before me on this _____ day of _____, 20_____.

(Seal) _____
(Notary Public Signature)

SECTION 01 77 22 SUBSTANTIAL COMPLETION PROCEDURES

PART 1 GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section includes administrative and procedural requirements for Contract closeout, including, but not limited to, Substantial Completion procedures.

B. Related Sections:
   1. Section 01 77 00: Closeout Procedures.

1.3 SUBMITTALS

A. Contractor's List of Incomplete Items (Punch List): Initial submittal at Substantial Completion.

1.4 SUBSTANTIAL COMPLETION PROCEDURES

A. Contractor's List of Incomplete Items: Prepare and submit a list of items to be completed and corrected (Contractor's punch list), indicating the value of each item on the list and reasons why the Work is incomplete.

B. Submittals Prior to Substantial Completion:
   1. Minimum of ten (10) days prior to requesting an inspection for determining date of Substantial Completion. List items that are incomplete at time of request:
      a. Certificates of release: Obtain and submit releases from all (i.e. city, county, authorities) authorities having jurisdiction permitting Owner unrestricted use of the Work and access to services and utilities. Include occupancy permits, operating certificates, and similar releases.
      b. Submit closeout submittals, including Project record documents, operation and maintenance manuals, final completion construction photographic documentation, damage or settlement surveys, property surveys, and similar final record information.
      c. Submit closeout submittals specified in individual Sections, including specific warranties, workmanship bonds, maintenance service agreements, final certifications, and similar documents.
      d. Submit maintenance material submittals specified in individual Sections, including tools, spare parts, extra materials, and similar items, and deliver to location designated by Architect. Label with manufacturer's name and model number where applicable:
         1) List of extra materials: Prepare and submit schedule of maintenance material submittal items, including name and quantity of each item and name and number of related Specification Section. Obtain Architect's signature for receipt of submittals.
      e. Submit test/adjust/balance records from Owner vendor.
      f. Submit changeover information related to Owner's occupancy, use, operation, and maintenance.

C. Procedures Prior to Substantial Completion:
   1. A minimum of ten (10) days prior to requesting inspection for determining date of Substantial Completion, submit list items that are incomplete at time of request:
      a. Advise Owner of pending insurance changeover requirements.
      b. Make final changeover of permanent locks and deliver keys to Owner. Advise Owner's personnel of changeover in security provisions.
      c. Complete startup and testing of systems and equipment.
      d. Perform preventive maintenance on equipment used prior to Substantial Completion.
      e. Instruct Owner's personnel in operation, adjustment, and maintenance of products, equipment, and systems. Submit demonstration and training video recordings as applicable.
      f. Advise Owner of changeover in heat and utilities.
      g. Participate with Owner in conducting inspection and walkthrough with local emergency responders.
      h. Terminate and remove temporary facilities from site, including mockups, construction tools, and similar elements, and restore or configure area to required or original condition.
      i. Complete final cleaning requirements, including touchup painting.
      j. Touch up and otherwise repair and restore marred exposed finishes to eliminate visual defects.
      k. Conditional lien regulations.

D. Inspection:
   1. Submit written request for inspection to determine Substantial Completion a minimum of ten (10) days prior to date the Work will be completed and ready for final inspection and tests. On receipt of request, Architect will either proceed with inspection or notify Contractor of unfulfilled requirements. Architect will prepare the Certificate of Substantial Completion after inspection or will notify Contractor of items, either on Contractor's list or additional items identified by Architect, that must be completed or corrected before certificate will be issued:
      a. Re-inspection: Request re-inspection when the Work identified in previous inspections as incomplete is completed or corrected.
      b. Results of completed inspection will form the basis of requirements for final completion.

PART 2 PRODUCTS (NOT USED)

PART 3 EXECUTION

3.1 FINAL CLEANING

A. Perform Final Cleaning:
   1. Conduct cleaning and waste-removal operations to comply with local laws and ordinances, and Federal and local environmental and antipollution regulations.
   2. Employ experienced workers or professional cleaners for final cleaning. Clean each surface or unit to condition expected in an average commercial building cleaning and maintenance program. Comply with manufacturer's written instructions:
      a. Complete cleaning operations before requesting inspection for certification of Substantial Completion for entire Project or for a designated portion of Project. Cleaning activities include but are not limited to:
         1) Clean site, yard, and grounds, in areas disturbed by construction activities, including landscape development areas, of rubbish, waste material, litter, and other foreign substances.
         2) Sweep paved areas broom clean. Remove petrochemical spills, stains, and

foreign deposits.

3) Rake grounds that are neither planted nor paved to a smooth, even-textured surface.
4) Remove tools, construction equipment, machinery, and surplus material from Project site.
5) Remove snow and ice to provide safe access to building.
6) Clean exposed exterior and interior hard-surfaced finishes to a dirt-free condition, free of stains, films, and similar foreign substances. Avoid disturbing natural weathering of exterior surfaces. Restore reflective surfaces to their original condition.
7) Remove debris and surface dust from limited access spaces, including roofs, plenums, shafts, trenches, equipment vaults, manholes, attics, and similar spaces.
8) Sweep concrete floors broom clean in unoccupied spaces.
9) Vacuum carpet and similar soft surfaces, removing debris and excess nap; clean according to manufacturer's recommendations if visible soil or stains remain.
10) Clean transparent materials, including mirrors and glass in doors and windows. Remove glazing compounds and other noticeable, vision-obscuring materials. Polish mirrors and glass, taking care not to scratch surfaces.
11) Remove labels that are not permanent.
12) Wipe surfaces of mechanical and electrical equipment, elevator equipment, and similar equipment. Remove excess lubrication, paint and mortar droppings, and other foreign substances.
13) Clean plumbing fixtures to a sanitary condition, free of stains, including stains resulting from water exposure.
14) Replace disposable air filters and clean permanent air filters. Clean exposed surfaces of diffusers, registers, and grills.
15) Clean ducts, blowers, and coils if units were operated without filters during construction or that display contamination with particulate matter on inspection:
    a) Clean HVAC system in compliance with NADCA Standard ACR 2013. Provide written report on completion of cleaning.
16) Clean light fixtures, lamps, globes, and reflectors to function with full efficiency.
17) Leave Project clean and ready for occupancy.

B. Pest Control:
   1. Comply with pest control requirements in Section 01 57 15: Integrated Pest Management. Prepare written report.

C. Construction Waste Disposal:
   1. Comply with waste disposal requirements.

END OF SECTION 01 77 22

SECTION 01 78 23 OPERATION AND MAINTENANCE DATA

PART 1 GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section includes administrative and procedural requirements for preparing operation and maintenance manuals, including the following:
   1. Operation and maintenance documentation directory manuals.
   2. Emergency manuals.
   3. Systems and equipment operation manuals.
   4. Systems and equipment maintenance manuals.
   5. Product maintenance manuals.

1.3 DEFINITIONS

A. Subsystem: A portion of a system with characteristics similar to a system.

B. System: An organized collection of parts, equipment, or subsystems united by regular interaction.

1.4 SUBMITTALS

A. Submit operation and maintenance manuals indicated. Provide content for each manual as specified in individual Specification Sections, and as reviewed and approved at the time of Section submittals. Submit reviewed manual content formatted and organized as required by this Section:
   1. Architect will comment on whether content of operation and maintenance submittals is acceptable.
   2. Where applicable, clarify and update reviewed manual content to correspond to revisions and field conditions.

B. Format:
   1. Submit operation and maintenance manuals in the following format:
      a. Submit on digital media acceptable to Architect or by uploading to web-based project software site or by email to Architect. Enable reviewer comments on draft submittals.
      b. Submit three (3) paper copies. Architect will return two (2) copies.

C. Initial Manual Submittal: Submit draft copy of each manual at least 30 days before commencing demonstration and training. Architect will comment on whether general scope and content of manual are acceptable.

D. Final Manual Submittal:
   1. Submit each manual in final form prior to requesting inspection for Substantial Completion and at least 15 days before commencing demonstration and training. Architect will return copy with comments:
      a. Correct or revise each manual to comply with Architect's and Commissioning Authority's comments. Submit copies of each corrected manual within 15 days of

receipt of Architect's comments and prior to commencing demonstration and training.

E. Comply with Section 01 77 00: Closeout Procedures for schedule for submitting operation and maintenance documentation. Where applicable use 01 91 13: General Commissioning Requirements.

1.5 FORMAT OF OPERATION AND MAINTENANCE MANUALS

A. Manuals, Electronic Files:
1. Submit manuals in the form of a multiple file composite electronic PDF file for each manual type required:
   a. Electronic files: Use electronic files prepared by manufacturer where available. Where scanning of paper documents is required, configure scanned file for minimum readable file size.
   b. File names and bookmarks: Bookmark individual documents based on file names. Name document files to correspond to system, subsystem, and equipment names used in manual directory and table of contents. Group documents for each system and subsystem into individual composite bookmarked files, then create composite manual, so that resulting bookmarks reflect the system, subsystem, and equipment names in a readily navigated file tree. Configure electronic manual to display bookmark panel on opening file.

B. Manuals, Paper Copy:
1. Submit manuals in the form of hard-copy, bound and labeled volumes:
   a. Binders:
      1) Heavy-duty, three-ring, vinyl-covered, loose-leaf binders, in thickness necessary to accommodate contents, sized to hold 8-1/2 by 11-inch (215 mm X 280 mm) paper, with clear plastic sleeve on spine to hold label describing contents and with pockets inside covers to hold folded oversize sheets:
         a) If two (2) or more binders are necessary to accommodate data of a system, organize data in each binder into groupings by subsystem and related components. Cross-reference other binders if necessary to provide essential information for proper operation or maintenance of equipment or system.
         b) Identify each binder on front and spine, with printed title "OPERATION AND MAINTENANCE MANUAL," Project title or name, and subject matter of contents, and indicate Specification Section number on bottom of spine. Indicate volume number for multiple-volume sets.
   b. Dividers: Heavy-paper dividers with plastic-covered tabs for each section of the manual. Mark each tab to indicate contents. Include typed list of products and major components of equipment included in the section on each divider, cross-referenced to Specification Section number and title of Project manual.
   c. Protective plastic sleeves: Transparent plastic sleeves designed to enclose diagnostic software storage media for computerized electronic equipment. Enclose title pages and directories in clear plastic sleeves.
   d. Supplementary text: Prepared on 8-1/2 by 11-inch (215 mm X 280 mm) white bond paper.
   e. Drawings:
      1) Attach reinforced, punched binder tabs on Drawings and bind with text:
         a) If oversize Drawings are necessary, fold Drawings to same size as text pages and use as foldouts.
         b) If Drawings are too large to be used as foldouts, fold and place Drawings in labeled envelopes and bind envelopes in rear of manual. At appropriate locations in manual, insert typewritten pages indicating Drawing titles, descriptions of contents, and Drawing locations.

1.6 REQUIREMENTS FOR EMERGENCY, OPERATION, AND MAINTENANCE MANUALS

A. Organization of Manuals:
   1. Unless otherwise indicated, organize each manual into a separate section for each system and subsystem, and a separate section for each piece of equipment not part of a system. Each manual shall contain the following materials, in the order listed:
      a. Title page.
      b. Table of contents.
      c. Manual contents.

B. Title Page:
   1. Include the following information:
      a. Subject matter included in manual.
      b. Name and address of Project.
      c. Name and address of Owner.
      d. Date of submittal.
      e. Name and contact information for Contractor.
      f. Name and contact information for Construction Manager.
      g. Name and contact information for Architect.
      h. Name and contact information for commissioning authority.
      i. Names and contact information for major consultants to Architect that designed the systems contained in the manuals.
      j. Cross-reference to related systems in other operation and maintenance manuals.

C. Table of Contents:
   1. List each product included in manual, identified by product name, indexed to the content of the volume, and cross-referenced to Specification Section number in Project Manual:
      a. If operation or maintenance documentation requires more than one volume to accommodate data, include comprehensive table of contents for all volumes in each volume of the set.

D. Manual Contents: Organize into sets of manageable size. Arrange contents alphabetically by system, subsystem, and equipment. If possible, assemble instructions for subsystems, equipment, and components of one system into a single binder.

E. Identification: In the documentation directory and in each operation and maintenance manual, identify each system, subsystem, and piece of equipment with same designation used in the Contract Documents. If no designation exists, assign a designation according to ASHRAE Guideline 4, "Preparation of Operating and Maintenance Documentation for Building Systems."

1.7 OPERATION AND MAINTENANCE DOCUMENTATION DIRECTORY MANUAL

A. Operation and Maintenance Documentation Directory:
   1. Prepare a separate manual that provides an organized reference to emergency, operation, and maintenance manuals. List items and their location to facilitate ready access to desired information. Include the following:
      a. List of systems and subsystems: List systems alphabetically. Include references to operation and maintenance manuals that contain information about each system.
      b. List of equipment: List equipment for each system, organized alphabetically by system. For pieces of equipment not part of system, list alphabetically in separate list.
      c. Tables of contents: Include a table of contents for each emergency, operation, and maintenance manual.

1.8 EMERGENCY MANUALS

A. Emergency Manual: Assemble a complete set of emergency information indicating procedures for use by emergency personnel and by Owner's operating personnel for types of emergencies indicated.

B. Content:
1. Organize manual into a separate section for each of the following:
   a. Type of emergency.
   b. Emergency instructions.
   c. Emergency procedures.

C. Type of Emergency:
1. Where applicable for each type of emergency indicated below, include instructions and procedures for each system, subsystem, piece of equipment, and component:
   a. Fire.
   b. Flood.
   c. Gas leak.
   d. Water leak.
   e. Power failure.
   f. Water outage.
   g. System, subsystem, or equipment failure.
   h. Chemical release or spill.

D. Emergency Instructions: Describe and explain warnings, trouble indications, error messages, and similar codes and signals. Include responsibilities of Owner's operating personnel for notification of Installer, supplier, and manufacturer to maintain warranties.

E. Emergency Procedures:
1. Include the following, as applicable:
   a. Instructions on stopping.
   b. Shutdown instructions for each type of emergency.
   c. Operating instructions for conditions outside normal operating limits.
   d. Required sequences for electric or electronic systems.
   e. Special operating instructions and procedures.

1.9 SYSTEMS AND EQUIPMENT OPERATION MANUALS

A. Systems and Equipment Operation Manual:
1. Assemble a complete set of data indicating operation of each system, subsystem, and piece of equipment not part of a system. Include information required for daily operation and management, operating standards, and routine and special operating procedures:
   a. Engage a factory-authorized service representative to assemble and prepare information for each system, subsystem, and piece of equipment not part of a system.
   b. Prepare a separate manual for each system and subsystem, in the form of an instructional manual for use by Owner's operating personnel.

B. Content:
1. In addition to requirements in this Section, include operation data required in individual Specification Sections and the following information:
   a. System, subsystem, and equipment descriptions. Use designations for systems and equipment indicated on Contract Documents.
   b. Performance and design criteria if Contractor has delegated design responsibility.
   c. Operating standards.

d. Operating procedures.
e. Operating logs.
f. Wiring diagrams.
g. Control diagrams.
h. Piped system diagrams.
i. Precautions against improper use.
j. License requirements including inspection and renewal dates.

C. Descriptions:
1. Include the following:
a. Product name and model number. Use designations for products indicated on Contract Documents.
b. Manufacturer's name.
c. Equipment identification with serial number of each component.
d. Equipment function.
e. Operating characteristics.
f. Limiting conditions.
g. Performance curves.
h. Engineering data and tests.
i. Complete nomenclature and number of replacement parts.

D. Operating Procedures:
1. Include the following, as applicable:
a. Startup procedures.
b. Equipment or system break-in procedures.
c. Routine and normal operating instructions.
d. Regulation and control procedures.
e. Instructions on stopping.
f. Normal shutdown instructions.
g. Seasonal and weekend operating instructions.
h. Required sequences for electric or electronic systems.
i. Special operating instructions and procedures.

E. Systems and Equipment Controls: Describe the sequence of operation and diagram controls as installed.

F. Piped Systems: Diagram piping as installed and identify color coding where required for identification.

1.10 SYSTEMS AND EQUIPMENT MAINTENANCE MANUALS

A. Systems and Equipment Maintenance Manuals:
1. Assemble a complete set of data indicating maintenance of each system, subsystem, and piece of equipment not part of a system. Include manufacturers' maintenance documentation, preventive maintenance procedures and frequency, repair procedures, wiring and systems diagrams, lists of spare parts, and warranty information:
a. Engage a factory-authorized service representative to assemble and prepare information for each system, subsystem, and piece of equipment not part of a system.
b. Prepare a separate manual for each system and subsystem, in the form of an instructional manual for use by Owner's operating personnel.

B. Content: For each system, subsystem, and piece of equipment not part of a system, include source information, manufacturers' maintenance documentation, maintenance procedures, maintenance and service schedules, spare parts list and source information, maintenance service contracts, and warranties and bonds as described below.

C. Source Information: List each system, subsystem, and piece of equipment included in manual, identified by product name and arranged to match manual's table of contents. For each product, list name, address, and telephone number of installer or supplier and maintenance service agent, and cross-reference Specification Section number and title in Project manual and Drawing or schedule designation or identifier where applicable.

D. Manufacturers' Maintenance Documentation:
   1. Include the following information for each component part or piece of equipment:
      a. Standard maintenance instructions and bulletins:
         1) Include only sheets pertinent to product or component installed. Mark each sheet to identify each product or component incorporated into the Work. If data include more than one (1) item in a tabular format, identify each item using appropriate references from the Contract Documents. Identify data applicable to the Work and delete references to information not applicable:
            a) Prepare supplementary text if manufacturers' standard printed data are not available and where the information is necessary for proper operation and maintenance of equipment or systems.
      b. Drawings, diagrams, and instructions required for maintenance, including disassembly and component removal, replacement, and assembly.
      c. Identification and nomenclature of parts and components.
      d. List of items recommended to be stocked as spare parts.

E. Maintenance Procedures:
   1. Include the following information and items that detail essential maintenance procedures:
      a. Test and inspection instructions.
      b. Troubleshooting guide.
      c. Precautions against improper maintenance.
      d. Disassembly; component removal, repair, and replacement; and reassembly instructions.
      e. Aligning, adjusting, and checking instructions.
      f. Demonstration and training video recording, if available.

F. Maintenance and Service Schedules:
   1. Include service and lubrication requirements, list of required lubricants for equipment, and separate schedules for preventive and routine maintenance and service with standard time allotment:
      a. Scheduled maintenance and service: Tabulate actions for daily, weekly, monthly, quarterly, semiannual, and annual frequencies.
      b. Maintenance and service record: Include manufacturers' forms for recording maintenance.

G. Spare Parts List and Source Information: Include lists of replacement and repair parts, with parts identified and cross-referenced to manufacturers' maintenance documentation and local sources of maintenance materials and related services.

H. Maintenance Service Contracts: Include copies of maintenance agreements with name and telephone number of service agent.

I. Warranties and Bonds:
   1. Include copies of warranties and bonds and lists of circumstances and conditions that would affect validity of warranties or bonds:
      a. Include procedures to follow and required notifications for warranty claims.

J. Drawings:
   1. Prepare Drawings supplementing manufacturers' printed data to illustrate the

relationship of component parts of equipment and systems and to illustrate control sequence and flow diagrams. Coordinate these Drawings with information contained in record Drawings to ensure correct illustration of completed installation:
a. Do not use original Project record documents as part of maintenance manuals.

1.11 PRODUCT MAINTENANCE MANUALS

A. Product Maintenance Manual: Assemble a complete set of maintenance data indicating care and maintenance of each product, material, and finish incorporated into the Work.

B. Content: Organize manual into a separate section for each product, material, and finish. Include source information, product information, maintenance procedures, repair materials and sources, and warranties and bonds, as described below.

C. Source Information: List each product included in manual, identified by product name and arranged to match manual's table of contents. For each product, list name, address, and telephone number of installer or supplier and maintenance service agent, and cross-reference Specification Section number and title in Project manual and Drawing or schedule designation or identifier where applicable.

D. Product Information:
1. Include the following, as applicable:
a. Product name and model number.
b. Manufacturer's name.
c. Color, pattern, and texture.
d. Material and chemical composition.
e. Reordering information for specially manufactured products.

E. Maintenance Procedures:
1. Include manufacturer's written recommendations and the following:
a. Inspection procedures.
b. Types of cleaning agents to be used and methods of cleaning.
c. List of cleaning agents and methods of cleaning detrimental to product.
d. Schedule for routine cleaning and maintenance.
e. Schedule for annual inspection and reports.
f. Repair instructions.

F. Repair Materials and Sources: Include lists of materials and local sources of materials and related services.

G. Warranties and Bonds:
1. Include copies of warranties and bonds and lists of circumstances and conditions that would affect validity of warranties or bonds:
a. Include procedures to follow and required notifications for warranty claims.

PART 2 PRODUCTS (NOT USED)

PART 3 EXECUTION (NOT USED)

END OF SECTION 01 78 23

SECTION 01 78 39 PROJECT RECORD DOCUMENTS

PART 1 GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section includes administrative and procedural requirements for Project record documents, including but not limited to:
   1. Record Drawings.
   2. Record Specifications.
   3. Record Product data.
   4. Miscellaneous record submittals.

1.3 SUBMITTALS

A. Record Drawings:
   1. Number of copies - Submit one (1) set of marked up record prints.
   2. Number of Copies - Submit copies of record Drawings:
      a. Initial submittal:
         1) Submit PDF electronic files of scanned record prints and one (1) of file prints.
         2) Architect will indicate whether general scope of changes, additional information recorded, and quality of drafting are acceptable.
      b. Final submittal:
         1) Submit PDF electronic files of scanned record prints and three (3) sets of prints.
         2) Submit record digital data files and three (3) sets of record digital data file plots.
         3) Plot each Drawing file, whether or not changes and additional information were recorded.

B. Record Specifications: Submit one (1) paper copy and one (1) annotated PDF electronic files of the Project Specifications, including addenda and Contract modifications.

C. Record Product Data:
   1. Submit one (1) paper copy and one (1) annotated PDF electronic file and directories of each submittal:
      a. Where record product data are required as part of operation and maintenance manuals, submit duplicate marked up product data as a component of manual.

1.4 PROJECT RECORD DOCUMENT PROCEDURES

A. Do not use Project record documents for construction purposes. Protect Project record documents from deterioration and loss. Provide access to Project record documents for Architect's reference:
   1. **Do not use** as-built Drawings and Specifications for record Drawings and Specifications.

B. Recording Procedures: Update Drawings and Specifications on daily bases to record actual conditions. Record information concurrently with construction progress. Do not conceal work

until required information is accurately recorded.

C. Store record documents and samples apart from as-built documents used for construction:
   1. Label and file record documents and samples in accordance with Section number listings in table of contents. Label each document ***PROJECT RECORD*** in neat, large, printed letters.
   2. Maintain record documents in clean, dry, and legible condition.
   3. Make record documents and samples available for inspection upon request of Architect.

PART 2 PRODUCTS

2.1 RECORD DRAWINGS

A. Record Prints:
   1. Maintain one (1) set of marked up paper copies of the Contract Drawings and shop drawings:
      a. Preparation:
         1) Mark record prints to show the actual installation where installation varies from that shown originally. Require individual or entity who obtained record data, whether individual or entity is installer, Subcontractor, or similar entity, to provide information for preparation of corresponding marked up record prints. Show actual installation conditions where installation varies from that shown originally:
            a) Give attention to information on concealed elements difficult to identify or measure and record later.
            b) Accurately record information in an acceptable drawing technique.
            c) Record data as soon as possible after obtaining it.
            d) Record and check the markup before enclosing concealed installations.
            e) Cross reference record prints to corresponding shop drawings or archive photographic documentation.
   2. Content:
      a. Types of items requiring marking include, but are not limited to, the following:
         1) Dimensional changes to Drawings.
         2) Revisions to details shown on Drawings.
         3) Depths of foundations below first floor.
         4) Locations and depths of underground utilities.
         5) Revisions to routing of piping and conduits.
         6) Revisions to electrical circuitry.
         7) Actual equipment locations.
         8) Duct size and routing.
         9) Locations of concealed internal utilities.
         10) Changes made by Change Order or Construction Change Directive.
         11) Changes made following Architect's written orders.
         12) Details not on the original Contract Drawings.
         13) Field records for variable and concealed conditions.
         14) Record information on the Work that is shown only schematically.
   3. Mark the Contract Drawings and shop drawings completely and accurately. Utilize personnel proficient at recording graphic information in production of marked up record prints.
   4. Mark record sets with erasable, red colored pencil. Use colors to distinguish between changes for different categories of the work at same location.
   5. Mark important additional information that was either shown schematically or omitted from original Drawings.
   6. Note Construction Change Directive numbers, alternate numbers, Change Order

numbers, and similar identification, where applicable.

B. Record Digital Data Files:
1. Immediately before inspection for Certificate of Substantial Completion, review marked up record prints with Architect. When authorized, prepare full set of corrected digital data files of the Contract Drawings:
   a. Format: Same digital data software program, version, and operating system as the original Contract Drawings and annotated PDF electronic file with comment function enabled.
   b. Incorporate changes and additional information previously marked on record prints. Delete, redraw, and add details and notations where applicable.
   c. Refer instances of uncertainty to Architect for resolution.
   d. Architect will furnish Contractor one (1) set of digital data files of the Contract Drawings for use in recording information:
      1) Refer to Section 01 33 00: Submittal Procedures for requirements related to use of Architect's digital data files.
      2) Architect will provide data file layer information. Record markups in separate layers.

C. Newly Prepared Record Drawings:
1. Prepare new Drawings instead of preparing record Drawings where Architect determines that neither the original Contract Drawings nor shop drawings are suitable to show actual installation:
   a. New Drawings may be required when a Change Order is issued as a result of accepting an alternate, substitution, or modification. Including ALL documents used for Construction Change Directive to DSA.
   b. Consult Architect for proper scale and scope of detailing and notations required to record the actual physical installation and its relation to other construction. Integrate newly prepared record Drawings into record Drawing sets; comply with procedures for formatting, organizing, copying, binding, and submitting.

D. Format:
1. Identify and date each record Drawing; include the designation ***PROJECT RECORD DRAWING*** in a prominent location:
   a. Record prints: Organize record prints and newly prepared record Drawings into manageable sets. Bind each set with durable paper cover sheets. Include identification on cover sheets.
   b. Format: Annotated PDF electronic file with comment function enabled.
   c. Record digital data files: Organize digital data information into separate electronic files that correspond to each sheet of the Contract Drawings. Name each file with the sheet identification. Include identification in each digital data file.
   d. Identification:
      1) As follows:
         a) Project name.
         b) Date.
         c) Designation PROJECT RECORD DRAWINGS.
         d) Name of Architect.
         e) Name of Contractor.

2.2 RECORD SPECIFICATIONS

A. Preparation:
1. Mark Specifications to indicate the actual product installation where installation varies from that indicated in Specifications, addenda, and Contract modifications:
   a. Give particular attention to information on concealed products and installations that cannot be readily identified and recorded later.

b. Mark copy with the proprietary name and model number of products, materials, and equipment furnished, including substitutions and product options selected.
c. Record the name of manufacturer, supplier, installer, and other information necessary to provide a record of selections made.
d. For each principal product, indicate whether record product data has been submitted in operation and maintenance manuals instead of submitted as record product data.
e. Note related Change Orders, record product fata, and record Drawings where applicable.

B. Format: Submit record Specifications as annotated PDF electronic file and marked up paper copy of Specifications. ALL documents to match PBK format.

2.3 RECORD PRODUCT DATA

A. Preparation:
1. Mark product data to indicate the actual product installation where installation varies substantially from that indicated in product data submittal:
   a. Give particular attention to information on concealed products and installations that cannot be readily identified and recorded later.
   b. Include significant changes in the product delivered to Project site and changes in manufacturer's written instructions for installation.
   c. Note related Change Orders, record Specifications, and record Drawings where applicable.

B. Format: Submit record product data as annotated PDF electronic file. Include record product data directory organized by Specification Section number and title, electronically linked to each item of record product data.

2.4 RECORD SAMPLES

A. Record Samples: Determine with Architect and Owner which submitted samples are to be maintained as record samples. Maintain and mark one (1) set to indicate date of review and approval by Architect; note any deviations or variations between reviewed sample and installed product or material.

2.5 MISCELLANEOUS RECORD SUBMITTALS

A. Assemble miscellaneous records required by the individual Specification Sections for miscellaneous record keeping and submittal in connection with actual performance of the Work. Bind or file miscellaneous records and identify each, ready for continued use and reference. Include the following:
1. Reviewed shop drawings, product data, and samples.
2. Field test reports.
3. Inspection certificates and manufacturer's certificates.
4. Inspections by authorities having jurisdiction (AHJ [DSA]).
5. Documentation of foundation depths.
6. Special measurements or adjustments.
7. Tests and inspections.
8. Surveys.
9. Design mixes.
10. DSA submitted CCDs.

B. Format: Submit miscellaneous record submittals as scanned PDF electronic file(s) of marked up miscellaneous record submittals. Include miscellaneous record submittals

directory organized by Specification Section number and title, electronically linked to each item of miscellaneous record submittals.

PART 3 EXECUTION

3.1 RECORDING AND MAINTENANCE

A. Recording: Maintain one (1) copy of each submittal during the construction period for Project record document purposes. Post changes and revisions to Project record documents as they occur; do not wait until end of Project.

B. Maintenance of Record Documents and Samples: Store record documents and samples in the field office apart from the Contract Documents used for construction. Do not use Project record documents for construction. Maintain record documents in good order and in a clean, dry, legible condition, protected from deterioration and loss. Provide access to Project record documents for Architect's reference during normal working hours.

END OF SECTION 01 78 39

SECTION 01 79 00 DEMONSTRATION AND TRAINING

PART 1 GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section includes administrative and procedural requirements for instructing Owner's personnel, including the following:
   1. Demonstration of operation of systems, subsystems, and equipment.
   2. Training in operation and maintenance of systems, subsystems, and equipment.
   3. Demonstration and training video recordings.
   4. Operation and maintenance manuals should be uploaded into Owner’s designated software.

1.3 SUBMITTALS

A. Instruction Program:
   1. Submit outline of instructional program for demonstration and training including a list of training modules and a schedule of proposed dates, times, length of instruction time, and instructors' names for each training module. Include learning objective and outline for each training module:
      a. Indicate proposed training modules utilizing manufacturer-produced demonstration and training video recordings for systems, equipment, and products in lieu of video recording of live instructional module.

B. Qualification Data: For instructor.

C. Attendance Record: For each training module, submit list of participants and length of instruction time.

D. Demonstration and Training Video Recordings:
   1. Submit two (2) copies within seven (7) days of end of each training module:
      a. Identification:
         1) On each copy, provide an applied label with the following information:
            a) Name of Project.
            b) Name and address of videographer.
            c) Name of Architect.
            d) Name of Contractor.
            e) Date of video recording.
      b. At completion of training, submit complete training manual(s) for Owner's use.

1.4 QUALITY ASSURANCE

A. Instructor Qualifications: A factory-authorized service representative, complying with requirements in Section 01 40 00: Quality Requirements, experienced in operation and maintenance procedures and training.

PART 2 PRODUCTS

2.1 INSTRUCTION PROGRAM

A. Program Structure: Develop an instruction program that includes individual training modules for each system and for equipment not part of a system, as required by individual Specification Sections.

B. Training Modules:
1. Develop a learning objective and teaching outline for each module. Include a description of specific skills and knowledge that participant is expected to master. For each module, include instruction for the following as applicable to the system, equipment, or component:
   a. Basis of system design, operational requirements, and criteria - include the following:
      1) System, subsystem, and equipment descriptions.
      2) Performance and design criteria if Contractor is delegated design responsibility.
      3) Operating standards.
      4) Regulatory requirements.
      5) Equipment function.
      6) Operating characteristics.
      7) Limiting conditions.
      8) Performance curves.
2. Documentation:
   a. Review the following items in detail:
      1) Emergency manuals.
      2) Operations manuals.
      3) Maintenance manuals.
      4) Project record documents.
      5) Identification systems.
      6) Warranties and bonds.
      7) Maintenance service agreements and similar continuing commitments.
3. Emergencies:
   a. Include the following, as applicable:
      1) Instructions on meaning of warnings, trouble indications, and error messages.
      2) Instructions on stopping.
      3) Shutdown instructions for each type of emergency.
      4) Operating instructions for conditions outside of normal operating limits.
      5) Sequences for electric or electronic systems.
      6) Special operating instructions and procedures.
4. Operations:
   a. Include the following, as applicable:
      1) Startup procedures.
      2) Equipment or system break-in procedures.
      3) Routine and normal operating instructions.
      4) Regulation and control procedures.
      5) Control sequences.
      6) Safety procedures.
      7) Instructions on stopping.
      8) Normal shutdown instructions.
      9) Operating procedures for emergencies.
      10) Operating procedures for system, subsystem, or equipment failure.
      11) Seasonal and weekend operating instructions.
      12) Required sequences for electric or electronic systems.
      13) Special operating instructions and procedures.
5. Adjustments:

a. Include the following:
   1) Alignments.
   2) Checking adjustments.
   3) Noise and vibration adjustments.
   4) Economy and efficiency adjustments.

6. Troubleshooting:
   a. Include the following:
      1) Diagnostic instructions.
      2) Test and inspection procedures.
7. Maintenance:
   a. Include the following:
      1) Inspection procedures.
      2) Types of cleaning agents to be used and methods of cleaning.
      3) List of cleaning agents and methods of cleaning detrimental to product.
      4) Procedures for routine cleaning
      5) Procedures for preventive maintenance.
      6) Procedures for routine maintenance.
      7) Instruction on use of special tools.
8. Repairs:
   a. Include the following:
      1) Diagnosis instructions.
      2) Repair instructions.
      3) Disassembly: Component removal, repair, and replacement, and reassembly instructions.
      4) Instructions for identifying parts and components.
      5) Review of spare parts needed for operation and maintenance.

PART 3 EXECUTION

3.1 COORDINATION

A. Coordinate instruction schedule with Owner's operations. Adjust schedule as required to minimize disrupting Owner's operations.

B. Coordinate instructors, including providing notification of dates, times, length of instruction time, and course content.

C. Coordinate content of training modules with content of approved emergency, operation, and maintenance manuals. Do not submit instruction program until operation and maintenance data has been reviewed and approved by Architect.

3.2 PREPARATION

A. Assemble educational materials necessary for instruction, including documentation and training module. Assemble training modules into a training manual organized in coordination with requirements in Section 01 78 23: Operation and Maintenance Data.

B. Set up instructional equipment at instruction location.

3.3 INSTRUCTION

A. Engage qualified instructors to instruct Owner's personnel to adjust, operate, and maintain systems, subsystems, and equipment not part of a system:
   1. Owner will furnish an instructor to describe Owner's operational philosophy.
   2. Owner will furnish Contractor with names and positions of participants.

B. Scheduling:
   1. Provide instruction at mutually agreed on times. For equipment that requires seasonal operation, provide similar instruction at start of each season:
      a. Schedule training with Owner through program manager with at least ten (10) days advance notice.

C. Cleanup: Collect used and leftover educational materials and give to Owner. Remove instructional equipment. Restore systems and equipment to condition existing before initial training use.

3.4 DEMONSTRATION AND TRAINING VIDEO RECORDINGS

A. General: Record each training module separately. Include classroom instructions and demonstrations, board diagrams, and other visual aids, but not student practice.

B. Video Recording Format: Provide high-quality color video recordings with menu navigation in format acceptable to Architect.

C. Recording: Mount camera on tripod before starting recording, unless otherwise necessary to show area of demonstration and training. Display continuous running time.

END OF SECTION 01 79 00

SECTION 01 91 13 GENERAL COMMISSIONING REQUIREMENTS

PART 1 GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. This Section establishes general and administrative requirements pertaining to commissioning (Cx) of equipment, devices, and building systems on the Project. Technical requirements for Cx of particular systems and components are established in the respective technical sections of this Project manual.

B. It is of primary concern that all operable systems installed in the Project perform in accordance with the Contract Documents, Owner's Project requirements and the basis of design. During Cx, Contractor systematically demonstrates to Owner or Owner's representative that the operable systems have been installed and perform in strict accordance with the Contract Documents.

C. Commissioning requires cooperation and involvement of all parties throughout the construction process. Contractor shall deliver a successful Cx process. Successful Cx requires that installation of all building systems complies with Contract Document requirements and that full operational check-out and necessary adjustments are performed prior to Substantial Completion with the exception of deferred tests approved in advance by Owner.

D. Commissioning will encompass and coordinate traditionally separate functions of:
   1. System documentation.
   2. Installation checkout.
   3. System verification checklists and start-up.
   4. Control system calibration and point-to-point checkout.
   5. Testing, adjusting, and balancing (TAB).
   6. Functional performance tests.
   7. Integrated system tests.
   8. Contractor demonstration to Owner and training of Owner's personnel:
      a. This requires assembling all related documentation into one (1) cohesive collection. Commissioning is intended to achieve the following specific objectives of the Contract Documents:
         1) Verify and document proper installation and intended performance of equipment, systems, and integrated systems.
         2) Ensure that operating and maintenance and Cx documentation requirements are complete.

E. Provide Owner with functional buildings and systems that meet the Contract Document requirements and Owner's Project requirements at Substantial Completion.

1.3 DEFINITIONS

A. Basis of Design: A document that records the concepts, calculations, decisions, and product selections used to meet Owner's Project requirements and to satisfy applicable regulatory requirements, standards, and guidelines. The document includes both narrative descriptions

and lists of individual items that support the design process.

B. Commissioning (Cx): A systematic process confirming that building systems have been installed, properly started, and consistently operated in strict accordance with the Project documents, that all systems are complete and functioning in accordance with the Contract Documents at Substantial Completion, and that Contractor has provided Owner adequate system documentation and training.

C. Commissioning Authority (CxA): Party having a contractual agreement with Owner to provide third party Cx services as defined herein under CxA's Role and Responsibilities. Commissioning Authority may represent Owner and is authorized to act on behalf of Owner. The CxA does not have authority to alter design or installation procedures without the written approval of Owner or the design team.

D. Contract Documents: The General Conditions, Drawings, Specifications, addenda, and other documents developed by the Architect/Engineer (A/E) Team and approved by Owner that constitute the contractual obligations of the Project scope.

E. Control Point and Sensor Calibration Verification: Process of verifying the point integrity and/or sensor calibration from the physical point of monitoring (sensor, contact, actuator, etc.) to the digital point location at the Operator's interface within the respective control system (building automation, lighting controls, power status and monitoring, etc.).

F. Deferred Testing: Functional performance or integrated system tests performed after Substantial Completion due to partial occupancy, partial equipment acceptance, seasonal requirements, design, or other site conditions that prohibit the test from being performed prior to Substantial Completion.

G. Deficiency: Condition of a component, piece of equipment, or system that is not in compliance with the Project documents.

H. Functional Performance Test: Test of dynamic function and operation of equipment and systems executed by Contractor and witnessed by the CxA. Systems are tested under various modes, such as during low cooling or heating loads, high loads, component failures, unoccupied, varying outside air temperatures, life safety conditions, power failure, etc. Systems are operated through all specified sequences of operation. Components are verified to be responding in accordance with requirements in the Project documents.

I. Functional Performance Testing Procedures: Commissioning protocols, detailed test procedures and instructions in tabular and script-type format that fully describe system configuration and steps required to determine if the system is performing and functioning properly.

J. Integrated Systems Test: Test of dynamic function and operation of multiple systems. Integrated systems tests are tested under various modes, such as fire alarm and emergency situations, life safety conditions, power failure, etc. Systems are integrally operated through all specified sequences of operation. Systems and interconnections are verified to be responding in accordance with the requirements in the Project documents.

K. Integrated Systems Testing Procedures: Commissioning protocols and detailed test procedures and instructions in tabular and script-type format that fully describe system configurations and steps required to determine if the interacting systems are performing and functioning properly.

L. Operational Testing: Activities and testing occurring after initial energizing and/or start-up of

equipment that determine whether equipment is operating within the manufacturer's recommendations and the design requirements. These activities are intended to ensure that equipment and systems meet all warranty requirements and are ready for functional performance testing. Common examples are TAB of HVAC systems and initial load testing of electrical equipment.

M. Owner's Project Requirements: A written document that details the functional requirements of a Project and the expectations of how the facility will be used and operated. These include Project goals, measurable performance criteria, cost considerations, benchmarks, success criteria, and supporting information.

N. Project Documents: Consists of the Contract Documents, approved submittals, Requests for Information (RFI), vendor documentation, operations and maintenance information, and other documentation that determines the requirements for acceptable installation and operation of the specific equipment and systems on the Project.

O. Start-up: The activities where equipment is initially energized, tested, and operated. Start-up is completed prior to operational testing and functional performance testing, and is an integral item documented in the system verification checklist.

P. System Verification Checklist: A list of static inspections and material or component tests that verify proper installation of equipment (e.g., belt tension, oil levels, labels affixed, gages in place, sensors calibrated, etc.), start-up activities and documentation, as well as operational testing results. The checklists are meant to document all activities for an individual piece of equipment from procurement on the Project through operational testing are performed in accordance with the requirements in the Project documents.

Q. Training Plan: A detailed plan prepared by Contractor and reviewed by Owner and CxA that outlines the training activities, instructors, time durations, and system requirements in accordance with the Contract Documents and Cx plan.

R. Trending: Data collection of monitored points using the building automation system, lighting controls system, power status and monitoring system, or independent data acquisition instrumentation.

1.4 COMMISSIONING TEAM

A. Owner shall appoint the following Members:
   1. Owner's project manager and any other designated representatives of Owner's staff.
   2. A/E.

B. Contractor shall appoint the following Members:
   1. Individuals, each having authority to act on behalf of the entity they represent, explicitly organized to implement the Cx process through coordinated actions. At a minimum, Contractor shall designate a Cx coordinator and each major subcontractor (MEP, building automation, etc.) shall have a dedicated representative.
   2. Vendor representatives (as needed) required for start-up, operational testing, functional performance testing, integrated systems testing, and Owner training activities.
   3. Representatives of independent testing agencies (TAB, Electrical Testing Agency, etc.).

1.5 ROLES AND RESPONSIBILITIES

A. Roles and responsibilities of Cx team members related to the Cx process are provided in

this Section. The respective entities defined below shall fulfill the listed roles and responsibilities as contained herein. Specific technical roles and responsibilities are defined in other Sections of the Project Specifications.

B. Owner's Roles and Responsibilities:
   1. Provide guidance in development of Owner's Project requirements.
   2. Review technical Specifications containing Cx requirements.
   3. Approve the Cx scope of Work and schedule of Cx activities.
   4. Assign Owner's representatives and schedule them to participate in Cx activities, including the following:
      a. Commissioning team meetings.
      b. Review and approval of the Cx plan, training plan, system verification checklist templates, functional performance test procedures, integrated systems test procedures, deferred testing plans, final Cx process report, systems manual, measurement and verification plan, and other Cx documents.
      c. Attend Owner training sessions in operation and maintenance of systems and equipment.
      d. Observation of Contractor's demonstration of systems and equipment operation.

C. Commissioning Authority's Roles and Responsibilities:
   1. Prepare the Cx plan with Owner's and Contractor's review and input.
   2. Periodically attend and/or review the proceedings of the regular construction meetings hosted by Contractor to understand the progress of construction activities on the Project.
   3. Conduct and document Cx team meetings including the Cx kickoff meeting.
   4. Perform site visits as necessary to observe component and system installations prior to energizing or start-up of equipment and systems.
   5. Review and comment on product data and shop drawing submittals and coordination drawings applicable to systems being commissioned.
   6. Following submittal review and approvals by the A/E team, review the sequences of operation and coordinate with Contractor and A/E team in order to prepare the functional performance test procedures and integrated systems test procedures. Submit to Owner and Contractor for review and comment prior to facilitating functional performance tests and integrated systems tests on the Project.
   7. Upon written notice that equipment or systems are ready for initial energizing or start-up, review the progress of the systems verification checklists for the respective systems and components and ensure that all requirements have been completed by Contractor to permit energizing or start-up in accordance with the Project documents; CxA shall issue written notice to Owner and Contractor that equipment is ready to energize or start-up. Commissioning Authority will witness and ensure proper documentation is provided by Contractor for major equipment energizing and start-ups as executed by Contractor with appropriate notice as indicated herein.
   8. Witness, verify, and document results of functional performance tests and integrated systems tests.
   9. Coordinate resolution of deficiencies identified during site observations, equipment energizing or start-up, functional performance testing, integrated systems testing, deferred testing, and during the warranty period.
   10. Review the operations and maintenance documents to ensure that as-built information and correct data is included prior to Owner training sessions; review final operations and maintenance submittal to ensure compliance with the requirements in the Project documents and provide written comments to Owner.
   11. Review Contractor's training plan and individual training agendas for compliance with the requirements in the Project documents. Recommend acceptance to Owner prior to Contractor scheduling training sessions with Owner. Review the attendance and content of the training sessions to ensure the requirements of the Project documents are completed. Conduct a survey of Owner's personnel to evaluate the effectiveness of

Owner training.

12. Compile the final Cx process report and submit to Owner for review and approval.

D. A/E's Roles and Responsibilities:
1. Specify control sequences of operation within the Contract Documents that comply with Owner's Project requirements and basis of design.
2. Incorporate Cx requirements into the Contract Documents if requested by Owner.
3. Attend Cx team meetings.
4. Review the Cx plan, system verification checklists templates, functional performance test procedures, integrated systems test procedures, deferred testing plans, and other Cx documents as required by Owner or the Contract Documents.
5. Review Contractor's training plan and provide comments to Owner.
6. Approve technical requirements for correction of deficiencies identified during Cx, deferred tests, and during the warranty period.
7. Review operation and maintenance manuals and provide comments to Owner.

E. Contractor's Roles and Responsibilities:
1. Contractor shall review and provide comments on documents produced by the CxA, and shall accept the Cx plan, system verification checklists, functional performance test procedures, and integrated system test procedures as approved by Owner.
2. Provide an individual, subject to Owner's approval, experienced in construction and Cx of building systems to organize, schedule, conduct, and document Contractor's responsibilities in the Cx process. Contractor shall assign this individual to act as Contractor's Cx coordinator. Contractor's Cx coordinator may have additional duties such as MEP coordinator, but not as project manager or superintendent. Submit qualifications demonstrating the Cx coordinator's technical expertise and experience to Owner for approval. If Contractor chooses to subcontract its Cx obligations, then Contractor must submit the subcontractor's qualifications and personnel to Owner for Owner's approval.
3. Furnish and install systems that meet all requirements of the Contract Documents.
4. Ensure that Cx process activities are incorporated into the master Project schedule. Contractor shall coordinate with the CxA and Owner to determine the required activities, durations, and predecessors.
5. Submit inspection requests, start-up requests, and all supporting documentation in accordance with the Contract Documents, General Conditions, and Cx plan.
6. Cooperate with Owner's representative(s), provide access to work, and provide adequate labor, resources, and time for Cx.
7. Furnish copies of all shop drawings and submittals, manufacturers' literature, maintenance information, and any other information required for the Cx process. Contractor must submit to Owner installation and checkout materials shipped inside equipment and actual field checkout sheet forms used by the factory or field technicians. This requirement does not supersede any additional requirements contained in the Contract Documents.
8. Schedule and conduct pre-installation meetings and pre-commissioning meetings with subcontractors and equipment suppliers related to Cx. Contractor must invite A/E, Owner, and CxA to attend the pre-installation meetings and pre-commissioning meetings.
9. Provide qualified personnel, including subcontractors as required, to fully perform the testing and operational demonstrations required by the Contract Documents and the Cx plan, including any deferred testing or re-testing related to warranty work.
10. Correct deficiencies identified during any stage of the Cx process.
11. Coordinate with the CxA to develop the training plan and submit to Owner for approval. Provide training to Owner's personnel in accordance with the Contract Documents and the approved training plan. Coordinate with Owner to schedule training sessions and coordinate subcontractor/vendor participation in all training sessions.
12. Perform deferred testing and make necessary amendments to operating and

maintenance manuals and as-built drawings for applicable issues identified during the deferred testing.

13. Perform system maintenance during construction as specified and recommended by Owner and send the maintenance records to Owner for record.
14. Document the equipment as it arrives onsite to ensure that the submitted and received equipment is correct as it arrives onsite, including the completion of the system verification sections pertaining to the procurement process.

1.6 SYSTEMS TO BE COMMISSIONED

A. The following systems shall be commissioned according to the process defined in this Section:
   1. Major HVAC Systems (including but not limited to the list below):
      a. Air handling units.
      b. Fan coil units.
      c. Exhaust fans.
      d. Supply fans.
      e. Pumps.
   2. Terminal units (ten percent [10%] sampling).
   3. Building automation system.
   4. Lighting controls - occupancy sensors (25 percent greater than 25 sensors installed, 100 percent less than 25 sensors installed).
   5. Lighting - daylight controls.
   6. Lighting - time switch controls.
   7. Normal and emergency power systems.

PART 2 PRODUCTS

2.1 COMMISSIONING PLAN

A. Document developed by the CxA that provides the structure, schedule, and coordination plan for the Cx process from the pre-construction phase through the occupancy phase. The Cx plan shall describe the Project and systems to be commissioned, Cx process activities and deliverables, procedures to follow throughout the process, specific roles and responsibilities for each participant, and general description of testing and verification methods.

B. The Cx plan shall comply with Owner Project requirements.

C. The Cx team shall review the Cx plan prior to the pre-commissioning meeting and submit written comments or questions to the CxA to be addressed in the meeting.

D. Following the pre-commissioning meeting, the CxA shall incorporate all changes discussed and agreed upon in the pre-commissioning meeting and submit the final Cx plan to the Cx team for approval and acceptance.

E. If changes to the Cx plan are needed during the Cx process, the CxA shall edit the plan and distribute to the Cx team for approval and acceptance.

F. Contractor’s acceptance shall constitute acceptance of all parties subcontracted to Contractor. Contractor shall ensure that all subcontractors and vendors agree and accept the Cx plan.

2.2 SYSTEM VERIFICATION CHECKLISTS

A. System verification checklists are important to ensure that the equipment and systems are connected and operational and that functional performance testing proceeds without unnecessary delays. These checklists document the inspections and procedures necessary to take a piece of equipment from a static state into an operating state. These checklists augment the manufacturer's start-up checklists to provide a complete document from procurement to the start of functional performance testing when combined.

B. The CxA shall develop the system verification checklist templates for review by the Cx team. Contractor, appropriate subcontractors, and vendors shall support the CxA in development of system verification checklists for each system and components by providing any necessary supporting documentation as requested by the CxA and reviewing and commenting on the checklist templates in accordance with the Project Specifications and the Cx plan.

C. Once the checklist templates are reviewed and accepted, the CxA will produce checklists for all equipment and components to be commissioned on the Project utilizing an electronic Cx database that is accessible via web portal or local field tool (i.e., iPad, tablet, laptop, etc.).

D. The CxA shall provide login access and training to Contractor and other members of the Cx team in the use of the electronic Cx database.

E. Contractor shall be responsible for completing the required sections of the system verification checklists utilizing the electronic Cx database and providing all supporting documentation via electronic transmittal to the CxA. Additional requirements for completion of the checklists are included in this Section and other technical Sections of the Specifications.

F. Once equipment arrives on the Project site, Contractor or subcontractors shall begin completing the individual checklists and continue throughout the installation process. The checklists are meant to be progressive and a tool for tracking progress.

G. Once the system verification checklists are electronically completed, the CxA will review and approve the checklists and supporting documentation and compile the information to include in the final Cx process report.

2.3 FUNCTIONAL PERFORMANCE TESTING PROCEDURES

A. The purpose of the functional performance testing procedures is to verify and document that the equipment and systems on the project individually perform in accordance with the requirements in the Contract Documents and meet Owner's Project requirements.

B. The CxA shall develop specific script-type test procedures to verify and document proper operation of each piece of equipment and system. Contractor shall provide any supporting information to the CxA that may be needed including, but not limited to, product submittals, operations and maintenance information, and sequences of operation. Once developed, the CxA will issue to the Cx team for review and comment.

C. The Cx team shall review the functional performance testing procedures and submit written comments or questions to the CxA. Contractor shall ensure that the subcontractors and any vendors that would be involved with functional performance testing review the procedures and provide comments.

D. The CxA will coordinate with the Cx team to address any comments and produce the final functional performance testing procedures for acceptance by the Cx team. Contractor's acceptance shall constitute acceptance of all parties subcontracted to Contractor.

E. Contractor shall utilize the functional performance testing procedures for any pre-testing activities prior to functional performance testing.

2.4 INTEGRATED SYSTEMS TESTING PROCEDURES

A. The purpose of the integrated systems testing procedures is to verify and document that all the integrated equipment and systems on the Project perform together in accordance with the requirements in the Contract Documents and meet Owner's Project requirements.

B. The CxA shall develop specific script-type test procedures to verify and document proper operation of the integrated systems throughout the facility. Contractor shall provide any supporting information to the CxA that may be needed including but not limited to product submittals, operation and maintenance information, and sequences of operation. Once developed, the CxA will issue to the Cx team for review and comment.

C. The Cx team shall review the integrated systems testing procedures and submit written comments or questions to the CxA. Contractor shall ensure that the subcontractors and any vendors that would be involved with integrated systems testing review the procedures and provide comments.

D. The CxA shall coordinate with the Cx team to address any comments and produce the final integrated systems testing procedures for acceptance by the Cx team. Contractor's acceptance shall constitute acceptance of all parties subcontracted to Contractor.

E. The CxA shall also develop the integrated system test personnel matrix that will be utilized to track the individual testing teams involved with the integrated system test. The CxA will distribute the matrix to the Cx team so that Contractor and Owner can assign the appropriate personnel to the appropriate teams.

F. The CxA shall also host a coordination meeting prior to the integrated system test to review the integrated system test procedures, complete any final coordination, review safety procedures, and answer any questions.

G. The CxA estimates there will be two integrated system tests on the Project. The first will test the data center systems separately and the second will test the entire facility. Requirements of the testing are included in the respective technical Sections of the Project Specifications.

H. The integrated systems testing procedures shall be utilized by Contractor for any pre-testing activities prior to official integrated systems testing.

2.5 TRAINING PLAN

A. Contractor, in coordination with Owner and CxA, shall develop the training plan with Project specific requirements for Owner training, after reviewing the different systems to be installed and commissioned. The purpose of the training plan is to specifically communicate the required content and training durations required by Owner based upon the type of equipment and Owner's experience.

B. Contractor shall review all of the individual technical sections of this Specification for specific training requirements.

C. Contractor shall coordinate with Owner to ensure that the proposed training requirements meet Owner's needs and expectations.

D. Contractor shall coordinate with the subcontractors and vendors to ensure Owner training

requirements can be achieved and gather any additional information or recommendations.

E. Any changes to the training requirements in this specification must follow contractual protocols.

F. The training plan shall include a list of systems and equipment for which training will be provided according to the three-tiered training approach outlined in the Project Specifications.

G. All training sessions shall have a syllabus indicating the following as a minimum in addition to any other specification requirements:
   1. Session objectives.
   2. Proposed instructor(s).
   3. Instructor qualifications.
   4. Training materials that will be provided.
   5. Location and durations of the various parts of the training session (i.e., classroom, onsite, etc.).
   6. Applicable Specification Sections and operation and maintenance manual sections.
   7. Detailed outline of training session content.

H. Contractor shall coordinate with the CxA to organize the systemic training sessions comparable to the organization of the systems manual.

I. Owner training must be completed prior to Contractor obtaining Substantial Completion by Owner.

2.6 FINAL COMMISSIONING PROCESS REPORT

A. The CxA shall prepare the final Cx process report that will include the following:
   1. Executive summary.
   2. Participants and roles.
   3. Brief building description.
   4. Overview of Cx and testing scope.
   5. General description of testing and verification methods.
   6. Appendices with supporting information, issues log, and communications.

B. Contractor shall coordinate with the CxA to provide any additional information that may be needed to complete the final Cx process report.

C. Contractor shall resolve any outstanding Cx items prior to the CxA preparing the final Cx report.

D. The CxA shall issue the final Cx process report to the Cx team for review. Owner shall approve the final Cx process report after any comments or discrepancies are resolved by the CxA.

PART 3 EXECUTION

3.1 PROJECT SCHEDULE

A. Contractor shall integrate all Cx activities into the detailed Project schedule. All parties will address scheduling problems and make necessary notifications in a timely manner to expedite the Cx process.

3.2 COMMISSIONING TEAM MEETINGS

A. Upon obtaining Owner's approval of the Cx plan, the CxA shall coordinate with the Cx team to schedule, plan, and conduct a pre-commissioning meeting with all parties involved in the Cx process. This meeting should include the major subcontractors, specialty manufacturers/suppliers, A/E, TAB Firm, Electrical Testing Agency, and Owner's representatives as participants.

B. Contractor shall prepare for the pre-commissioning meeting by supplying the following documents created by the CxA to all applicable subcontractors and vendors: Cx plan, example system verification checklists, example functional performance test procedures, and example integrated systems test procedures.

C. The CxA shall conduct the pre-commissioning meeting and review all aspects of the Cx plan and applicable Specifications.

D. The Cx plan shall be reviewed with all attendees and the scope of work discussed. Contractor should be prepared to distribute copies of the pertinent sections to the various subcontractors involved in the Cx process.

E. The outcome of the meeting shall be an understanding of the Cx process, roles and responsibilities, and consensus acceptance of the Cx plan by the Cx team.

F. Contractor may request additional meetings with the CxA and individual subcontractors to clarify roles, responsibilities, and procedures as needed.

3.3 TEST EQUIPMENT

A. Contractor shall provide all specialized tools, test equipment, and instruments required to execute start-up, checkout, and testing of equipment.

B. All specialized tools, test equipment and instruments required to execute start-up, checkout, and testing of equipment shall be of sufficient quality and accuracy to test and/or measure system performance within specified tolerances. A testing laboratory must have calibrated test equipment within the previous 12 months. Calibration shall be NIST traceable. Contractor must calibrate test equipment and instruments according to manufacturer's recommended intervals and whenever the test equipment is dropped or damaged. Calibration tags must be affixed to the test equipment or certificates readily available.

3.4 REPORTING

A. Beginning at the procurement stage for the equipment included in the Cx scope, Contractor shall communicate at least monthly with all members of the Cx team, keeping them apprised of construction progress and scheduling changes.

B. Contractor shall submit deficiency reports to Owner within five (5) days of the deficiency occurrence. This includes responses to items noted by the CxA.

3.5 DEFICIENCY RESOLUTION

A. The CxA shall document any issues noted during observation or testing activities in the CxIL. The CxIL shall be distributed electronically to the Cx team at regular intervals.

B. Contractor shall respond in writing to the CxA within ten [10] days to all new CxIL items regardless of the disposition. This response does not constitute a request for re-verification, only an acknowledgement of the outstanding item. Contractor should utilize CxIL responses to update the Cx team on the progress of deficiency resolution.

C. Contractor shall respond to the CxA and Owner indicating CxIL items that are completed and ready for the CxA to verify completion.

D. If any item indicated complete by Contractor is found to be incomplete by the CxA upon re-verification, Contractor is responsible for all costs and additional compensation resulting from incomplete CxIL items.

3.6 REQUEST FOR ENERGIZING / START-UP OF EQUIPMENT

A. Owner and/or Owner's representative may install lockout devices on equipment in addition to Contractor's lockout/tagout devices once permanent power is connected to the facility. This lock would be removed once the proper start-up notification is received by Owner and/or the CxA, and the CxA has reviewed the appropriate system verification checklists and supporting documentation to verify the equipment is ready for energizing and/or start-up.

B. These requirements do not supersede any additional requirements noted elsewhere in the Contract Documents or as required by applicable code authorities.

C. Contractor shall notify Owner and the CxA in writing to request initial energizing and/or start-up of equipment and systems at least 72 hours (not including weekends or holidays) prior to the scheduled start-up.

D. Contractor shall complete the applicable sections of the system verification checklists evidencing Contractor's thorough inspection of the system and readiness for start-up activities as required by the Project documents and the Cx plan. Contractor shall submit required supporting documentation to Owner and/or the CxA including, but not limited to, factory testing reports, alignment reports, electrical testing reports and any other documentation required by the Project documents prior to energizing and/or start-up.

E. The CxA shall review the system verification checklists and supporting documentation within the 72-hour notice period and confirm in writing that the systems and equipment are approved to proceed with energizing and start-up.

F. The CxA and/or owner may witness equipment energizing and/or start-up at the scheduled time, but witness is not required, unless noted elsewhere in the Specifications, as long as written approval is received as noted herein.

G. Contractor shall perform start-up under supervision of the responsible manufacturer's representative in accordance with manufacturer's instructions and Project document requirements.

H. Contractor shall complete all required factory start-up documentation and applicable items in the system verification checklist, prior to startup, to ensure compliance with the requirements in the Project documents.

3.7 OPERATIONAL TESTING

A. Once the appropriate start-up activities are completed, Contractor shall complete all necessary operational testing requirements included in the Project documents prior to functional performance testing. Specific requirements for systems and equipment are included in other technical Sections of the Specifications.

B. Contractor shall complete all operational testing items in the system verification checklist and submit all supporting documentation to Owner and/or CxA for review.

C. Contractor and manufacturer's representatives shall supervise and coordinate adjustments and balancing of all devices and systems for proper operation prior to requesting a functional performance test.

D. Contractor shall clearly list outstanding items or system verification checklist items not completed successfully. Contractor shall obtain from subcontractor or vendor completed forms documenting any outstanding deficiencies within five (5) days of completion of energizing and/or start-up activities.

E. Contractor shall review completed deficiencies to determine if outstanding items prevent execution of the functional performance tests and shall issue any necessary responses to Owner and/or the CxA.

F. Contractor shall notify Owner and CxA in writing to request functional performance testing of equipment and systems at least 72 hours (not including weekends or holidays) prior to the scheduled activities. Owner may require Contractor to reschedule functional performance testing to ensure availability of Owner's representative(s) as needed.

G. The CxA shall review the system verification checklists and supporting documentation within the 72-hour notice period and confirm in writing that the systems and equipment are approved to proceed with functional performance testing.

H. If any item indicated complete by Contractor is found to be incomplete by the CxA upon re-verification Contractor is responsible for all costs and additional compensation resulting from incomplete system verification checklist items.

3.8 CONTROL POINT AND SENSOR CALIBRATION VERIFICATION

A. Automation systems installed on the Project must be fully verified for point integrity and sensor calibration prior to functional performance testing. Additional requirements for this verification are listed in other technical Sections of the Specifications.

B. Contractor shall verify these points according to the requirements in the Project documents as part of start-up and operational testing of systems.

C. The TAB contractor shall independently verify each sensor and point and document the results to be included in the final TAB report.

D. The CxA will witness, at their discretion, this verification and/or independently verify and document the results to be included in the final Cx process report.

E. These activities must be completed prior to Contractor requesting functional performance testing as indicated herein.

3.9 FUNCTIONAL PERFORMANCE TESTING

A. The objective of functional performance testing is to demonstrate that each system operates according to the requirements in the Project documents and meets Owner's Project requirements and basis of design.

B. Contractor shall operate, or cause to be operated, each system, device, or equipment item, both intermittently and continuously, for a duration period as indicated in the Specification Section(s) for each item and/or in accordance with the Project documents, the Cx plan and applicable functional performance testing procedures.

C. Contractor shall operate each component device and each building system to the full extent of its capability, from minimum to maximum, and under automatic control and manual control.

D. The CxA and members of the Cx team, including Owner's personnel, may observe functional performance testing of equipment components and systems. The CxA shall facilitate the functional performance testing activities according to the accepted functional performance testing procedures and record the results of all testing activities.

E. The CxA shall record any deficiencies noted during the testing in the CxIL. If significant deficiencies exist, Owner and/or CxA may request that the testing activities be terminated and re-scheduled after proper verification by Contractor. Contractor is responsible for all costs and additional compensation resulting from deficiencies and incomplete systems noted during scheduled functional performance testing.

F. All functional performance testing of integrated dystems must be completed in accordance with the Project documents and the Cx plan prior to Contractor scheduling the integrated systems testing activities.

3.10 INTEGRATED SYSTEMS TESTING

A. The objective of integrated systems testing is to demonstrate that each integrated system operates jointly and/or independently of other systems according to the requirements in the Contract Documents.

B. Contractor shall operate each system, jointly and independently of other systems, through selected modes of operation (fire alarm integration with HVAC, emergency power modes, equipment failures among related systems, etc.) according to the accepted integrated systems testing procedures developed by the CxA. The CxA shall facilitate and document the testing, organizing the appropriate testing teams and providing sufficient instruction to all participants to conduct efficient and effective testing activities.

C. Integrated systems testing typically involves multiple teams with representation from the CxA, Owner, and Contractor. Contractor shall provide any needed communication equipment (i.e., radios) or make available any centralized intercom or paging system for communication with all testing groups.

D. Contractor shall provide no less than seven (7) days (not including weekends or holidays) notice when requesting to conduct the integrated systems testing. All personnel must be assigned to the personnel matrix by the CxA and a coordination meeting held within the seven (7) day period as prescribed elsewhere in this Section.

E. Contractor conducts integrated systems testing after all applicable functional performance testing is satisfactorily completed and approved by Owner and/or CxA.

F. The CxA shall record any deficiencies noted during the testing in the CxIL. If significant deficiencies exist, Owner and/or CxA may request that the testing activities be terminated and re-scheduled after proper verification by Contractor. Contractor is responsible for all costs and additional compensation resulting from deficiencies and incomplete systems noted during scheduled integrated systems testing.

3.11 DEMONSTRATION AND OWNER TRAINING

A. Contractor, in coordination with Owner and CxA, shall develop the training plan with Project-specific requirements for Owner training as required throughout various Sections of the

Project Specifications.

B. The specific requirements for scheduling and conducting Owner training are included in other sections of this Specification.

C. Owner training activities shall not occur until the training plan is approved by Owner and Contractor has submitted all operation and maintenance information for review and use during the training sessions.

D. Contractor shall notify the CxA of all training sessions. Contractor shall record attendance of the training sessions and Owner shall ensure the appropriate personnel are in attendance.

E. The CxA shall ensure the content of Owner training sessions meets the requirements in the Project documents.

F. The CxA may conduct surveys of Owner's personnel to gauge the effectiveness of Owner training sessions. If unfavorable surveys are received by Owner's personnel indicating unsatisfactory training, Owner reserves the right to require Contractor to re-train in those specific areas of nonconformance until the requirements in the Project documents are satisfactorily completed.

G. Owner training must be completed prior to Contractor obtaining substantial completion by Owner.

3.12 DEFERRED / SEASONAL TESTING

A. All construction phase requirements of the Cx process must be completed prior to Substantial Completion or as indicated elsewhere in this Specification.

B. If any testing or other requirements cannot be completed prior to Substantial Completion due to the building structure, required occupancy condition, or other condition, performance of such test may be delayed to later in the warranty period, upon approval of Owner. Contractor shall reschedule testing according to the protocols described in this Section and any other operational protocols prescribed by Owner.

C. Contractor shall complete all outstanding Cx requirements as part of this Contract during the warranty period. Contractor shall schedule all activities with Owner and/or CxA.

D. The CxA shall document any deferred testing activities and ensure the appropriate Cx documents are updated. Contractor shall provide any additional documentation needed by the CxA to complete these requirements.

END OF SECTION 01 91 13

SECTION 02 21 00 SURVEYS

PART 1 GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Division 01 Specifications Sections, apply to this Section.

1.2 SUMMARY

A. Section relates to execution of survey construction staking and addresses the following:
   1. Personnel and applicable responsibilities for surveying and staking.
   2. Procedures and time limitations.
   3. Consideration of monuments and damage.

B. Contractor shall furnish and set construction stakes and marks to establish the lines and grades required for completion of the Work as shown on the Plans and specified in the Project Specifications.

PART 2 PRODUCTS (NOT USED)

PART 3 EXECUTION

A. Construction staking shall be performed under the direction of a licensed land surveyor or registered professional Engineer familiar with construction surveying and staking.

B. Construction staking shall be performed as necessary to control the Work. Construction stakes and marks shall be furnished and set with accuracy adequate to assure that the completed Work conforms to the lines, grades, and sections shown on the Plans.

C. Contractor shall provide a construction staking request in writing to Owner and the Engineer no less than 72 hours prior to the desired time for construction staking to be performed.

D. Construction stakes shall be removed from the site by Contractor when no longer needed. Removal and disposal of construction staking materials is the sole responsibility of Contractor.

E. In the event Contractor’s operations destroy any of the survey control points, Contractor shall replace such control points at his expense, subject to verification by the Engineer. The cost of any such verification or replacement of the control surveys will be the sole responsibility of Contractor with no additional cost to Owner. Contractor will not be allowed any adjustment in Contract Time for such verification or replacement of survey control points.
   1. When applicable, DSA IR to review replacement stakes with General Contractor.

F. Contractor must preserve all Geographic Reference Stations, section corners, and all other legal property monuments of any kind during all construction and related activities. It is Contractor's responsibility to become familiar with the survey control and documentation of the site and surrounding property prior to conducting activities on the site that may potentially jeopardize such facilities.

G. Contractor shall give written notice to Owner and the Engineer at least five (5) working days

in advance of any need to disturb or destroy any of the monuments of the site. Contractor must receive approval for such destruction or disturbance from Owner and Engineer prior to conducting the work.

H. Only a professional land surveyor registered in the State of California will be permitted to perform surveying to reset or replace destroyed monuments. The professional land surveyor shall follow all rules, regulations, provisions, and laws of the State of California, as applicable for such work.

I. The cost of replacement of monuments destroyed or disturbed by Contractor will be the sole responsibility of Contractor and be at no additional cost to Owner.

END OF SECTION 02 21 00

SECTION 02 30 00 SUBSURFACE INVESTIGATION

PART 1 GENERAL

1.1 DESCRIPTION

A. Section includes:

B. This section describes the subsurface conditions observed during the Geotechnical Investigation for this project. The Geotechnical Report is available for review upon written request from the Architect for the cost of printing.

C. Related Work:
1. Section 31 00 00: Earthwork
2. Geotechnical Investigation Report: See attachments

1.2 QUALITY ASSURANCE

A. Prior to bidding, bidders may request their own subsurface investigations to satisfy themselves as to site and subsurface conditions. Any such investigations shall be performed only under time schedules and arrangements approved in advance by the Architect.

1.3 OBSERVED SUBSURFACE CONDITIONS

A. Subsurface Conditions:
1. See the Geotechnical Investigation Report as described in Section 31 00 00: Earthwork

B. Actual Conditions:
1. The subsurface information provided is based on soil borings and observations made during the Geotechnical Investigation and are not a guarantee of actual subsurface conditions. If any variations or undesirable conditions are encountered during construction, the contractor shall notify the Geotechnical Engineer and the Architect so that supplementary direction can be given.
   a. Review when applicable with DSA IR.
2. Existing utilities and facilities shown are based on record drawings and surface observations. The contractor shall verify locations of existing utilities to protect, identify for relocation, or remove, as necessary for the performance of work to complete this project.

PART 2 PRODUCTS (NOT USED)

PART 3 EXECUTION (NOT USED)

END OF SECTION 02 30 00

SECTION 02 41 00 DEMOLITION

PART 1 GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section Includes:
1. Furnishing all labor, materials, and equipment necessary for demolition, dismantling, cutting, and alterations as indicated, specified, and required for completion of the Contract, as applicable. Includes items such as the following:
   a. Protecting existing work to remain.
   b. Hazardous material identification and removal.
   c. Utility service and termination.
   d. Removing debris and equipment.
   e. Removal of items indicated on Drawings.
   f. Landscape and sprinkler demolition and reinstall.
   g. Disposal of material.

B. Related Sections:
1. Section 01 50 00: Temporary Facilities and Controls.
2. Section 01 57 13: Erosion control.
3. Section 01 74 19: Construction Waste Management and Disposal.
4. Section 02 21 00: Surveys.
5. Section 31 00 00: Earthwork.
6. Section 33 00 00: Utilities.

C. Regulatory Requirements:
1. Conform to applicable jurisdictional authority regulations and codes for disposal of debris.
2. Coordinate clearing work with utility companies.
3. Maintain emergency access ways at all times.
4. Contractor shall comply with all applicable laws and ordinances regarding hazardous materials, including contaminated soils, hazardous material transformers, and similar materials or components.

1.3 SUBMITTALS:

A. Schedule: Submit a detailed sequence of demolition and removal work, including dates for shutoff, capping, and continuance of utility services.

B. Procedures: Submit written procedures documenting the proposed methods to be used to control dust and noise.

1.4 EXISTING CONDITIONS

A. Contractor shall acquaint himself with all site conditions. If unknown active utilities are encountered during work, notify Architect promptly for instructions. Failure to notify will make Contractor liable for damage to these utilities arising from Contractor's operations subsequent to discovery of such unknown active utilities.

B. Conduct demolition to minimize interference with adjacent structures or items to remain. Maintain protected egress and access at all times.

PART 2 PRODUCTS (NOT USED)

PART 3 EXECUTION

3.1 EXISTING CONDITIONS

A. Contractor shall acquaint himself with all site conditions. If unknown active utilities are encountered during Work, notify Architect promptly for instructions. Failure to notify will make Contractor liable for damage to these utilities arising from Contractor's operations subsequent to discovery of such unknown active utilities.

B. Conduct demolition to minimize interference with adjacent structures or items to remain. Maintain protected egress and access at all times.

3.2 PROTECTION

A. Adequate protection measures shall be provided to protect workmen and passers-by on and off the site. Adjacent property shall be fully protected throughout the operations. Blasting will not be permitted. Prevent damage to adjoining improvements and properties both above and below grade. Restore such improvements to original condition should damage occur. Replace trees and shrubs outside building area disturbed by operations.

B. In accordance with generally accepted construction practices, Contractor shall be solely and completely responsible for working conditions at the jobsite, including safety of all persons and property during performance of the Work. This requirement shall apply continuously and shall not be limited to normal working hours.

C. Safety precautions prevent damage to existing elements identified to remain or to be salvaged and prevent injury to the public and workmen engaged onsite. Demolish roofs, walls, and other building elements in such a manner that demolished materials fall within foundation lines of building. Do not allow demolition debris to accumulate onsite. Pull down hazardous work at end of each day; do not leave standing or hanging overnight, or over weekends:
   1. Protect existing items that are not indicated to be altered. Protect utilities designated to remain from damage.
   2. Protect trees, plant growth, and features designated to remain as final landscaping as shown on Drawings.
   3. Protect bench marks from damage or displacement.

D. Trees: Carefully protect existing trees that are to remain. Provide temporary irrigation as necessary to maintain health of trees.

E. Fire Safety: Contractor shall conform to Chapter 33 of the California Fire Code (CFC), "Fire Safety During Construction and Demolition," at all times during the construction process. A copy of this chapter can be provided.

F. Any construction review of Contractor's performance conducted by the geotechnical Engineer is not intended to include review of the adequacy of Contractor's safety measures in, on, or near the construction site.

G. Surface Drainage: Provide for surface drainage during period of construction in a manner to

avoid creating nuisance to adjacent areas. Contractor shall make a reasonable effort on a daily basis to keep all excavations and the site free from water during entire progress of Work, regardless of cause, source, or nature of water.

H. Adjacent streets and sidewalks shall be kept free of mud, dirt, or similar nuisances resulting from earthwork operations.

I. The site and adjacent influenced areas shall be watered as required to suppress dust nuisance. Dust control measures shall be in accordance with the local jurisdiction.

3.3 EXAMINATION

A. Examine conditions of work in place before beginning Work; report defects.

B. Report existence of hazardous materials or unsafe structural conditions.

3.4 PREPARATION

A. Scheduling:
   1. General: Coordinate and schedule demolition work as required by Owner and as necessary to facilitate construction progress.

B. Hazardous Materials:
   1. General: Identify chemicals, gases, explosives, acids, flammables, or other dangerous materials before proceeding with demolition operations, and notify such jurisdictional agencies as may be required. Collect and legally dispose of such materials at official disposal locations away from the site.
   2. Asbestos: If asbestos or materials containing asbestos are encountered, stop work immediately and contact Owner. Do not proceed with demolition until directed by Owner.

C. Utility and Service Termination:
   1. Locate and identify existing utility, service, and irrigation system components affected by Work of this Contract. Review existing record Drawings, conduct site investigations, contact Underground Service Alert and other qualified cable/pipe/line locator services, and implement all other means necessary to define the location of underground systems.
   2. Prior to beginning any demolition, properly disconnect all water, gas, and electrical power supply at appropriate disconnect locations. Obtain all necessary releases and approvals from serving utility companies.
   3. Prior to demolition or disconnect, obtain Owner's approval that such system does not impact facilities or systems beyond the extent of this Contract.
   4. Mark location of disconnected systems. Identify and indicate stub-out locations on Project record documents.

D. Verify that existing plant life and features designated to remain are tagged or identified.
   1. Architect will mark the features, trees, and shrubs to remain within the construction area. Contractor shall not commence clearing and grubbing operations until authorized by Owner and all protective measures are in place.

E. Coordinate the time and duration of all system disconnects with Owner.

3.5 DEMOLITION

A. General Requirements:

1. Clear areas required for access to site and execution of Work, including pavement, structures, foundations, vegetation, trash, and debris.
2. Coordinate with Owner the time of day and route to remove demolished materials from premises.
3. Remove demolished materials from site as work progresses. Upon completion of work, leave areas of work in clean condition.
4. Remove all buried debris, rubble, trash, or other material not deemed suitable by the geotechnical Engineer.
5. Fill all voids or excavations resulting from clearing, demolition, or removal of vegetation with specified fill material.

B. Fixture and Equipment Removal:
1. Remove existing fixtures and equipment as identified and shown on Drawings and required by Architect.
2. Verify all service connections to fixtures and equipment designated for removal have been properly disconnected.
3. Remove all conductors from conduit at all abandoned circuits.

3.6 UTILITY AND BUILDING SERVICES REMOVAL AND RE-INSTALLATION

A. Where crossing paths and potential points of interference with existing utility services are shown or can be reasonably inferred from surface conditions or evidence of subsurface systems, such as meter boxes, vaults, relief vents, cleanouts, and similar components:
1. Review all Contract Documents showing crossing paths and potential points of interference.
2. Pot-hole or determine by other means the accurate depth and location of such utilities.
3. Incorporate all costs required to complete work under this Contract, including additional trenching, re-routing of existing and new utilities, and all means necessary to construct work under this Contract.
4. No additional cost to Owner will be allowed for work necessary to accommodate utility conflicts where such crossing paths are shown on Contract Drawings or can be reasonably inferred from surface conditions or components.

B. Remove all conductors from conduit at all abandoned electrical circuits.

C. Seal off ends of all piping, drains, and other components as directed by Architect and serving utility.

D. Where necessary to maintain service to existing utility and building systems, relocate or redirect all conduit and conductors, piping, drains, and associated system components:
1. Re-circuit all electrical as required.
2. Re-circuit all landscape irrigation valving and control systems as required.
3. Temporarily terminate landscape system components in approved boxes or with approved caps, suitable for re-connection or extension.
4. Extend or otherwise modify all site drainage systems, including catch basins, drain inlets, and piping. Fine grade to maintain proper drainage flow pattern to drains.

E. Demolish structure in an orderly and careful manner:
1. Use of explosives prohibited.

3.7 SITE PAVEMENT REMOVAL

A. Remove sidewalk and curb where required for new construction as specified and as indicated on the Drawings:
1. Remove all paving by saw-cutting.

2. Remove concrete paving and curbing at locations shown on Drawings. Locate closest adjacent expansion or weakened plane joint to define start of removal or saw-cutting.

B. Remove asphalt concrete paving areas where required for new construction as specified and as indicated on the Drawings:
   1. Remove all paving by saw-cutting.
   2. Remove paving assembly as required to expose subgrade.

3.8 LANDSCAPE AND IRRIGATION SYSTEMS DEMOLITION AND RENOVATION

A. Clearing, Grubbing, and Planting Demolition:
   1. Remove grass and grass roots to a minimum depth of two inches (2”) below existing grade.
   2. Remove all shrubs, plants, and other vegetation within the area of the work unless designated to remain. Grub and remove all roots of all vegetation to a depth of 24 inches below existing grade.
   3. Remove only those trees that are specifically designated for removal, or as shown on the Drawings, within the construction area. Remove all stumps. Remove root ball and root systems larger than one inch (1”) in diameter to a depth of two feet (2’) below existing or finished grades, whichever is lower, and a minimum of five feet (5’) beyond the edge of paving, structure, wall, or walkway.
   4. Hand cut existing tree roots over one inch (1”) in diameter as necessary for trenching or other new construction. Apply multiple coats of emulsified asphalt sealant especially made for horticultural use on cut or damaged plant tissues to cut faces and adjacent surfaces. Cover exposed roots with wet burlap to prevent roots from dying out until backfilling is complete.
   5. Disking and mixing of vegetation, trash, debris, and other deleterious materials with surface soils prior to grading is not permitted.
   6. Remove all buried debris, organic material, rubble, trash, or other material not deemed suitable by the geotechnical Engineer.
   7. Fill all voids or excavations resulting from clearing, demolition, or removal of vegetation with fill material in compliance with Section 31 00 00: Earthwork.
   8. Selected equipment of such sizes and capacities that the existing environment is disturbed as little as possible, and to afford ease of mobility within limited and relatively confined work areas. Make every effort to preserve the topography in its natural state.
   9. Keep drains, catch basins, surface drainage courses, and related drainage system components clear of debris and construction materials.
   10. Remove irrigation piping and appurtenances as necessary within area of work, unless noted otherwise to remain. Replace irrigation piping and appurtenances to irrigate new and/or existing landscaping. Contractor shall be responsible for temporary landscape irrigation until such time that irrigation system is restored and operational.

3.9 DISPOSAL

A. Demolished materials become property of the Contractor and shall be removed from premises, except those items specifically listed to be retained by Owner.

B. Dispose of all demolished material, trash, debris, and other materials not used in the work in accordance with the regulations of jurisdictional authority.

C. It is required that all materials that are of a recyclable nature, be transported to a suitable legal recycling facility instead of a dump or refuse facility (unless they are one-in-the same).

D. Burning and Burying of Materials: **Not allowed**.

E. Haul Routes:
   1. Obtain permits as required by jurisdictional agencies. Establish haul routes in advance; post flagmen for the safety of the public and workmen.
   2. Keep streets free of mud, rubbish, etc. Assume responsibility for damage resulting from hauling operations; hold Owner free of liability in connection therewith.

F. Remove demolished materials and debris from site on a daily basis.

3.10 CLEANING

A. Upon completion of work of this Section, promptly remove from the working area all scraps and debris.

B. Clean excess material from the surface of all remaining paved surfaces and utility structures.

C. Power wash all concrete surfaces to remove stains, dried mud, tire marks, and rust spots.

END OF SECTION 02 41 00

SECTION 03 11 00 CONCRETE FORMWORK

1. PART 1 GENERAL

1.1 SECTION INCLUDES

A. Formwork for cast-in-place concrete, with shoring, bracing, and anchorage.

B. Openings for other affected work.

C. Form accessories.

D. Stripping forms.

1.2 REFERENCES

A. CBC - California Building Code, (CCR) California Code of Regulations , Title 24, Part 2, Chapter 19.

B. ACI 301 - Specifications for Structural Concrete for Buildings.

C. PS 1-09 - Structural Plywood.

1.3 SYSTEM DESCRIPTION

A. Design, engineer, and construct formwork, shoring, and bracing to meet design and code requirements, so that resultant concrete conforms to required shapes, lines, and dimensions.

1.4 QUALITY ASSURANCE

A. Construct and erect concrete formwork in accordance with ACI 301.

1.5 REGULATORY REQUIREMENTS

A. Conform to CBC - California Building Code, (CCR) California Code of Regulations , Title 24, Part 2.

2. PART 2 PRODUCTS

2.1 FORM MATERIALS

A. Plywood: PS1-09, BB Plyform grade, Class I, Exterior classification.

B. Lumber: Douglas Fir species; construction grade; with grade stamp clearly visible.

2.2 FORMWORK ACCESSORIES

A. Form Ties: Snap-off metal of adjustable length; cone type; 1 inch break back dimension; free of defects that will leave holes no larger than one inch diameter in concrete surface.

B. Form Release Agent: Colorless material which will not stain concrete, absorb moisture, or impair natural bonding or color characteristics of coating intended for use on concrete.

C. Fillets for Chamfered Corners: Wood strips type; 3/4 x 3/4 inch size; maximum possible lengths.

D. Dovetail Anchor Slots: Minimum 22 gage galvanized steel; foam filled; release tape sealed slots; bent tab anchors; securable to concrete formwork; manufactured by Heckmann Building Products Co., www.heckmannbuildingprods.com.

E. Flashing Reglets: 26 gage thick galvanized steel; longest possible lengths; release tape sealed slots; with alignment splines for joints; securable to concrete formwork; Type CO reglet manufactured by Fry Reglet www.fryreglet.com.

F. Nails, Spikes, Lag Bolts, Through Bolts, Anchorages: Sized as required; of strength and character to maintain formwork in place while placing concrete.

3. PART 3 EXECUTION

3.1 INSPECTION

A. Verify lines, levels, and measurements before proceeding with formwork.

3.2 PREPARATION

A. Obtain Architect's approval for use of earth forms for footings.

B. Minimize form joints. Symmetrically align joints and make watertight to prevent leakage of mortar.

C. Arrange and assemble formwork to permit stripping, so that concrete is not damaged during its removal.

D. Arrange forms to allow stripping without removal of principal shores, where required to remain in place.

3.3 ERECTION

A. Erect formwork, shoring and bracing to achieve design requirements, in accordance with requirements of ACI 301.

B. Provide bracing to ensure stability of formwork. Strengthen formwork liable to be overstressed by construction loads.

C. Camber slabs and beams to achieve ACI 301 tolerances.

D. Provide chamfer strips on external corners of columns and walls.

E. Obtain approval before framing openings in structural members which are not indicated on Drawings.

F. Do not displace or damage vapor barrier placed by Section 03 30 00.

G. Construct formwork to maintain tolerances in accordance with ACI 301.

3.4 APPLICATION OF FORM RELEASE AGENT

A. Apply form release agent on formwork in accordance with manufacturer's instructions. Apply prior to placing reinforcing steel, anchoring devices, and embedded items.

B. Do not apply form release agent where concrete surfaces are scheduled to receive applied coverings which may be affected by agent. Soak contact surfaces of untreated forms with clean water. Keep surfaces wet prior to placing concrete.

3.5 INSERTS, EMBEDDED PARTS, AND OPENINGS

A. Provide formed openings where required for work embedded in or passing through concrete.

B. Coordinate work of other Sections in forming and setting openings, slots, recesses, chases, sleeves, bolts, anchors, and other inserts.

C. Install accessories in accordance with manufacturer's instructions, level and plumb. Ensure items are not disturbed during concrete placement.

3.6 FORM REMOVAL

A. Do not remove forms and bracing until concrete has sufficient strength to support its own weight and imposed loads.

B. Do not damage concrete surfaces during form removal.

1. It is the sole responsibility of the Contractor to see that concrete is not damaged in any way from the removal of the forms. If damage to concrete is observed while the forms are being removed, removal operations shall be suspended for such time (48 hours minimum) that the concrete has attained the additional strength necessary to provide for damage-free form removal.

2. Forms shall remain in place for the following minimum time periods:

a. For floor slab edge forms, curbs, and other minor structures with less than 18 inches of exposed vertical formed surfaces - 72 hours minimum.

b. For walls - 7 days minimum.

C. Store reusable forms for exposed architectural concrete to prevent damage to contact surfaces.

3.7 CLEANING

A. Clean forms to remove foreign matter as erection proceeds.

B. Ensure that water and debris drain to exterior through clean-out ports.

3.8 EARTH FORMS

A. Construct wood edge strips at top sides of excavations as indicated on drawings.

B. Provide forms for footings and foundation walls wherever concrete cannot be placed against solid earth.

C. Remove loose dirt and debris from form area prior to concrete placement.

D. Concrete for foundations may be placed directly into neat excavations provided the foundation trench walls are stable as determined by the Architect (Structural Engineer).

E. When earth formed foundations are used, the minimum formwork shown on the drawings is mandatory to insure clean excavations prior to and during concrete placement.

F. Provide 3-1/2 inch high starter wall for all concrete and masonry walls below grade.

END OF SECTION

SECTION 03 20 00 CONCRETE REINFORCING

1. PART 1 GENERAL

1.1 SECTION INCLUDES

A. Reinforcing steel bars, welded steel wire fabric fabricated steel bar or rod mats for cast-in-place concrete.

B. Support chairs, bolsters, bar supports, and spacers, for supporting reinforcement.

1.2 REFERENCES

A. CBC - California Building Code, (CCR) California Code of Regulations, Title 24, Part 2, Chapter 19 (ACI 318).

B. ACI 301 - Specifications for Structural Concrete for Buildings.

C. ACI 315 (SP-66) - Details and Detailing of Concrete Reinforcement.

D. ACI 318 - Building Code Requirements for Structural Concrete.

E. ASTM A1064 - Carbon-Steel Wire and Welded Wire Reinforcement, Plain and Deformed, for Concrete.

F. ASTM A615 - Deformed and Plain Carbon-Steel Bars for Concrete Reinforcement.

G. ASTM A706 - Standard Specification for Low Alloy Steel Deformed Bars for Concrete Reinforcement.

H. ASTM C1116 - Specification for Fiber-Reinforced Concrete and Shotcrete.

I. AWS D1.4 - Structural Welding Code Reinforcing Steel.

J. CRSI - Manual of Practice.

K. CRSI - Placing Reinforcing Bars.

1.3 QUALITY ASSURANCE

A. Perform concrete reinforcement work in accordance with CRSI Manual of Standard Practice.

B. Conform to ACI 301 and ACI 315 (SP-66).

C. Conform to CBC California Building Code, (CCR) California Code of Regulations , Title 24, Part 2.

1.4 CERTIFICATES

A. Submit mill test certificates of supplied concrete reinforcing, indicating physical and chemical analysis.

2. PART 2 PRODUCTS

2.1 MATERIALS

A. Reinforcing Steel: ASTM A615, Grade 40 for No. 4 bars and smaller, Grade 60 for No. 5 bars and larger. Billet-steel deformed bars, uncoated finish.

B. Welded Reinforcement: ASTM A706, Grade 60, deformed bars, unfinished.

C. Welded Steel Wire Fabric: ASTM A1064 plain type; coiled rolls; uncoated finish.

D. Steel Wire: ASTM A1064, plain, cold drawn steel.

2.2 ACCESSORY MATERIALS

A. Tie Wire: Minimum 16 gage annealed type.

B. Chairs, Bolsters, Bar Supports, Spacers: Sized and shaped for strength and support of reinforcement during installation and placement of concrete including load bearing pad on bottom to prevent vapor barrier puncture.

2.3 FABRICATION

A. Fabricate in accordance with ACI 315 (SP-66), providing concrete cover specified in Section 03 30 00.

B. Locate reinforcing splices not indicated on Drawings at points of minimum stress.

C. Weld reinforcing bars in accordance with AWS D1.4.

3. PART 3 EXECUTION

3.1 INSTALLATION

A. Before placing concrete, clean reinforcement of foreign particles or coatings.

B. Place, support, and secure reinforcement against displacement. Do not deviate from alignment or measurement.

C. Mix fibrous reinforcement into concrete material according to Section 03 30 00.

D. Do not displace or damage vapor barrier required by Section 03 30 00.

3.2 FIELD QUALITY CONTROL

A. Field inspection and testing will be performed under provisions of District's Division 01 General Requirements.

END OF SECTION

SECTION 03 30 00 CAST-IN-PLACE CONCRETE

1. PART 1 GENERAL

1.1 SECTION INCLUDES

A. Cast-in-place concrete foundation walls, and footings.

B. Floors and slabs on vapor barrier.

C. Control, expansion, and contraction joint devices associated with concrete work.

D. Building walls.

E. Retaining walls, utility slabs.

F. Equipment pads, Light pole bases, Flag pole bases and elevator pit.

G. Concrete fill over metal deck.

1.2 REFERENCES

A. The 2010 Americans with Disabilities Act (ADA) Standards for Accessible Design.

B. CBC - California Building Code, (CCR) California Code of Regulations Title 24, Part 2, Chapter 19.

C. CBC - California Building Code, (CCR) California Code of Regulations, Title 24, Part 2, California State Accessibility Standards.

D. ACI 301 - Specifications for Structural Concrete for Buildings.

E. ACI 302.1R - Guide for Concrete Floor and Slab Construction.

F. ACI 305R - Hot Weather Concreting.

G. ACI 306.R - Standard Specification for Cold Weather Concreting.

H. ACI 318 - Building Code Requirements for Structural Concrete.

I. ASTM C33 - Concrete Aggregates.

J. ASTM C94 - Ready-Mixed Concrete.

K. ASTM C109 - Standard Test Method for Compressive Strength of Hydraulic Cement Mortars.

L. ASTM C150 - Portland Cement.

M. ASTM C289 - Potential Reactivity of Aggregate.

N. ASTM C309 - Liquid Membrane Forming Compound.

O. ASTM C330 - Lightweight Aggregates for Structural Concrete.

P. ASTM C494 - Standard Specifications for Chemical Admixtures for Concrete.

Q. ASTM C567 - Unit Weight of Structural Lightweight Concrete.

R. ASTM C618- Standard Specification for Coal Fly Ash and Raw or Calcined Natural Pozzolan for Use as a Mineral Admixture for Concrete.

S. ASTM C932 - Surface-Applied Bonding Agents.

T. ASTM C1315 - Liquid Membrane-Forming Compounds Having Special Properties for Curing and Sealing Concrete.

U. ATM C1602 - Standard Specification for Mixing Water Used in the Production of Hydraulic Cement Concrete.

V. ASTM D226 - Asphalt Saturated Organic Felt used in Roofing and Waterproofing.

W. ASTM D1751 - Preformed Expansion Joint Filler for Concrete Paving and Structural Construction.

X. ASTM E96 – Standard Test Methods for Water Vapor Transmission of Materials.

Y. ASTM E154 - Standard Test Methods for Water Vapor Retardants used in Contact with Earth Under Concrete Slabs, on Walls, or as Ground Cover.

Z. ASTM E1643 - Installation of Water Vapor Retarders used in Contact with Earth or Granular Fill Under Concrete Slab.

AA. ASTM E1155 - Standard Test Method for Determining FF Floor Flatness and FL Floor Levelness Number. Reference Section 03 35 10 - Polished Concrete Floor System.

BB. ASTM E1745 - Standard Specifications for Plastic Water Vapor Retarders Used in Contact with Soil Or Granular Fill Under Concrete Slabs.

CC. ASTM F1249 - Standard Test Method for Water Vapor Transmission Rate Through Plastic Film and Sheeting Using a Modulated Infrared Sensor.

DD. ASTM F1869 - Standard Test Method for Measuring Moisture Vapor Emission Rate of Concrete Subfloor Using Anhydrous Calcium Chloride.

EE. National Ready Mix Concrete Association - Plant Certification Program.

FF. Stormwater Best Management Practice Handbook (BMP Handbook), Construction Edition, as published by the California Storm Water Quality Association.

1.3 QUALITY ASSURANCE

A. Perform work in accordance with ACI 301.

B. Installation of vapor barrier shall be in accordance with ASTM E1643 and manufacturer's installation guides and recommendations. Provide Architect written site reports from manufacturer's field service representative, indicating observation of vapor barrier installation prior to concrete placement.

C. Obtain concrete materials from same source throughout the Work.

1.4 QUALIFICATIONS

A. Manufacturer: Manufacturer of ready-mix concrete products complying with ASTM C94 requirements for production facilities and equipment. Certified according to National Ready Mix Concrete Associates Plant Certification Program.

1.5 DESIGN MIX

A. Submit design mix for each class of concrete, prepared by a California Registered Civil Engineer, to Testing Laboratory and Architect for review.

1.6 REGULATORY REQUIREMENTS

A. Conform to CBC - California Building Code, (CCR) California Code of Regulations , Title 24, Part 2.

B. Conform to CBC - California Building Code, (CCR) California Code of Regulations, Title 24, Part 2, and the 2010 ADA Standards for Accessible Design for access requirements for individuals with disabilities.

1.7 SUBMITTALS

A. Submit product data and manufacturer's instructions for all accessories under provisions of District's Division 01 General Requirements.

1.8 PRE-INSTALLATION CONFERENCE

A. Convene a conference two weeks prior to commencing placement of floor slab work of this section, under provisions of Section 01 31 00.

B. Require attendance of parties directly affecting the work of this Section.

C. Agenda:

1. Placement of subgrade beneath floor slab.

2. Testing of subgrade beneath floor slab.

3. Delivery and placement of concrete.

4. Testing and inspection procedures for concrete.

5. Submittal of mix design for concrete.

6. Hot and cold weather concreting procedures.

7. Vapor barrier location and installation.

8. Placement of control and expansion joints.

9. Steel reinforcement installation.

10. Installation of inserts and embedded items.

11. Finishes and finishing.

12. Forming and form removal limitations.

13. Floor slab flatness and levelness requirements.

14. Curing process and procedures.

15. Protection of finished floor slabs.

16. Floor slab joint and crack repair.

17. Moisture vapor transmission testing.

1.9 WARRANTY

A. Provide fifteen year warranty from curing, hardening and vapor barrier compound manufacturer under provisions of District's Division 01 General Requirements.

B. Warranty: Include coverage for removal and replacement of finish floor materials that delaminate from interior floor slabs due to moisture migration and excessive vapor emissions or due to presence of efflorescence and alkali contaminates.

1. Subfloor Moisture Conditions: Moisture emission rate of no more than 3 lb/1000 sq. ft./24 hours when tested by Quantitive Anhydrous Calcium Chloride Test, ASTM F1869, with subfloor temperature not less than 65 degrees F.

2. Subfloor Alkalinity Conditions: A pH range of between 5 to 9 when subfloor is wetted with potable water and pHdrion paper is applied.

3. Warranty to be supported by $1,000,000.00 product liability insurance policy issued directly to the Owner.

C. Provide warranty from vapor barrier manufacturer that products meet the current requirements of ASTM E1745 and will be free from material defects for the life of the building.

1.10 ENVIRONMENTAL REQUIREMENTS

A. Provide concrete curing, finishing, and waste management techniques as defined in Section 4 of the Storm Water Best Management Practice Handbook, (BMP Handbook) Construction Edition.

2. PART 2 PRODUCTS

2.1 FORMWORK

A. As specified in Section 03 11 00.

2.2 REINFORCEMENT

A. Reinforcing steel as specified in Section 03 20 00.

2.3 CONCRETE MATERIALS

A. Cement: ASTM C150, Type I or Type II Portland type; low alkali; grey color.

B. Fine and Coarse Aggregates Normal Weight Concrete: ASTM C33, non reactive when tested in accordance with ASTM C289 and Appendix X-1 of ASTM C33.

C. Fine and Coarse Aggregate, Light Weight Concrete: ASTM C330.

D. Water: ASTM C1602, clean and not detrimental to concrete.

2.4 ADMIXTURES

A. Fly Ash: ASTM C618, Class F.

B. Water Reducing Admixture: ASTM C494, Type A.

C. Shrinkage reducing admixture: ASTM C-494 Type S.

D. Calcium chloride, or any other admixtures not allowable.

2.5 VAPOR BARRIER

A. Material: 15 mil thick polyethylene film meeting the requirements of ASTM E1745, Class A, with a maximum permeance of 0.01 perms in accordance with ASTM E96/E154, Section 7, and a Water Vapor Transmission Rate (WVTR) of less than 0.0037 when tested according to ASTM F1249.

B. Accessories:

1. Minimum 4 inch wide polyethylene seaming tape with pressure sensitive adhesive.

2. Minimum 6 inch wide multi-layered textured polyethylene concrete bonding tape.

3. Polymer-modified liquid vapor retarder mastic.

4. PVC termination bar with pre-drilled holes.

5. All accessories provided by vapor barrier manufacturer.

C. Manufacturers:

1. Fortifiber Building Products, www.fortifiber.com.

2. Poly-America, www.yellowguard.com.

3. Reef Industries, www.reefindustries.com.

4. Stego Industries, www.stegoindustries.com.

5. Substitutions: Under Provisions of District's Division 01 General Requirements.

2.6 ACCESSORIES

A. Underlayment: ASTM D226, Type I (No. 15) asphalt saturated roofing felt.

B. Bonding Agent: ASTM C932; Weld-Crete as manufactured by Larsen Products Corp., www.larsenproducts.com.

C. Non-shrink Grout: Premixed compound consisting of non-metallic aggregate, cement, water reducing and plasticizing agents; capable of developing minimum compressive strength of 7000 psi in 28 days.

D. Joint Filler: ASTM D1751, 1/2 inch thick. See 07 92 00, 2.3 G for acceptable products.

E. Sand Fill: Manufactured "crusher run" sand free of silt, clay, loam, friable or soluble materials or organic matters, all passing the No. 4 sieve and only 5 percent passing the No. 200 sieve.

F. Curing, Hardening and Vapor Barrier Compound: ASTM C1315, Type I, Class A and ASTM C309, Type 1, Class A, with maximum volatile organic compound (VOC) content rating as required to suit regulatory requirements. Material to have no less than 34 percent penetrating solids, have no visible sheen and be compatible with floor finish materials and overlayments. Provide the following:

1. PMC 3300 Penetrating Sealer manufactured by Curranseal, www.curranseal.com.

G. Sealing Compound: Ashford Formula manufactured by Curecrete Distribution, Inc., www.ashfordformula.com.

H. Slip Resistant Aggregate: 95 percent minimum fused homogeneous aluminum oxide.

I. Concrete Floor Slab, Saw Cut, Joint, Crack, Repair Material: Cement-based, polymer-modified product that can be feathered at edges to match adjacent floor elevations. Color to be approved by District. Compressive strength not less than 4,200 psi at 28 days when tested according to ASTM C109. Equivalent to ARDEX SD-F Feather Finish, www.ardex.com. Epoxy base to be equivalent to W. R. Meadows Rezi-Weld Flex semi-rigid epoxy, www.wrmeadows.com.

J. Substitutions: Under provisions of District's Division 01 General Requirements.

2.7 CONCRETE MIX

A. Mix concrete in accordance with ASTM C94 ACI 318, Section 5.3.

B. Footings and Foundation Walls: Proportion normal-weight concrete mixture as follows:

1. Minimum Compressive Strength: 4,000 psi at 28 days.

2. Maximum Water-Cement Materials Ratio: 0.60.

3. Aggregate Size: 1 inch maximum.

4. Slump Limit: 4 inch maximum.

5. Fly Ash: Maximum 25 percent by weight.

C. Concrete Fill over Metal Deck: Proportion light-weight concrete mixture as follows:

1. Minimum Compressive Strength: 4,000 psi at 28 days.

2. Maximum Water-Cement Materials Ratio: 0.45.

3. Aggregate Size: 3/4 inch maximum.

4. Slump Limit: 4 inch maximum.

5. Fly Ash: Maximum 25 percent by weight.

6. Shrinkage Reducing Admixture: per structural Drawings.

D. Slabs-On-Grade: Proportion normal-weight concrete mixture as follows:

1. Minimum Compressive Strength: 4,000 psi at 28 days.

2. Minimum Cement Materials Content: 540 lb./cu. yd.

3. Maximum Water-Cement Materials Ratio: 0.45.

4. Aggregate Size: 3/4 inch maximum.

5. Slump Limit: 4 inch maximum.

6. Shrinkage Reducing Admixture: per structural Drawings.

7. Fly Ash: Maximum 25 percent by weight.

E. Exterior Walks, Pads and other non-structural uses: Proportion normal weight concrete mixture as follows:

1. Minimum Compressive Strength: 3,000 psi at 28 days.
2. Maximum Water-Cement Materials Ratio: 0.50.
3. Aggregate Size: 1 inch maximum.
4. Slump Limit: 4 inch maximum.
5. Air Content: 2.5 percent, plus or minus 0.5 percent.
6. Fly Ash: Maximum 25 percent by weight.

F. Building Walls: Proportion normal weight concrete mixture as follows:

1. Minimum Compressive Strength: 5,000 psi at 28 days.
2. Maximum Water-Cement Materials Ratio: 0.45.
3. Aggregate Size: 1 inch maximum.
4. Slump Limit: 4 inch maximum.
5. Fly Ash: Maximum 25 percent by weight.

3. PART 3 EXECUTION

3.1 INSPECTION

A. Verify anchors, seats, plates, reinforcement, and other items to be cast into concrete are accurately placed, held securely, and will not cause difficulty in placing concrete.

3.2 PREPARATION

A. At locations where new concrete is dowelled to existing work, drill holes in existing concrete, insert steel dowels, and set in epoxy adhesive.

3.3 VAPOR BARRIER

A. Install vapor barrier in compliance with ASTM E1643 under interior slabs over sand subgrade.

B. Install vapor barrier to exterior surface of below grade building foundation walls and grade beams. Seal to vertical surface of foundation wall with pressure sensitive tape and termination bar at an elevation consistent with the top of the adjacent finish grade.

C. Lay vapor barrier with long dimension parallel with long dimension of space.

D. Lap vapor barrier over footing and seal to vertical surface of interior foundation wall with pressure sensitive tape and termination bar at an elevation consistent with the top of the slab or terminate vapor barrier at horizontal edge of slab and foundation wall with continuous strip of concrete bonding tape.

E. Overlap all joints in vapor barrier 6 inches and seal with tape.

F. Seal all pipe penetrations of vapor barrier with pipe boot fabricated from vapor barrier material, tape and mastic.

G. Repair damaged areas with vapor barrier, overlapping damaged area by 6 inches and taping all four sides.

3.4 PLACING CONCRETE

A. Notify Architect minimum 24 hours prior to commencement of concreting operations.

B. Place concrete in accordance with ACI 301.

C. Hot Weather Placement: ACI 305R.

1. Maintain concrete temperature below 90 deg F at time of placement. Chilled mixing water or chopped ice may be used to control temperature, provided water equivalent of ice is calculated to total amount of mixing water.

2. Fog-spray forms, steel reinforcement, and subgrade just before placing concrete in hot weather. Keep subgrade uniformly moist without standing water, soft spots, or dry areas.

D. Cold Weather Placement: ACI 306R.

1. When average high and low temperature is expected to fall below 40 deg F for three successive days, maintain delivered concrete mixture temperature within the temperature range required by ACI 306.1

E. Ensure reinforcement, inserts, embedded parts and formed joints are not disturbed during concrete placement.

F. Do not disturb or damage vapor barrier while placing concrete. Repair damage as required to maintain integrity of barrier.

G. Place concrete continuously between predetermined construction and control joints. Do not break or interrupt successive pours such that cold joints occur.

H. Place interior floor slabs on fill in a strip sequence pattern.

I. Excessive honeycomb or embedded debris in concrete is not acceptable.

J. At slabs receiving a polished finish, placed concrete and roll with a tool to push the aggregates down to minimize visual impact. The desired finish is salt and pepper. See 03 35 10 for additional information.

3.5 JOINTS

A. Slab joints shall be constructed as described in the structural drawings. Joints shall be of three types as follows:

1. Construction Joints - joints occurring between two different concrete pours.

2. Control Joints - saw-cut or tooled joints made in fresh concrete to control cracking.

3. Expansion Joints - also known as isolation joints, joints creating a complete break in two concrete areas or items for the purpose allowing for expansion and contraction, or, for isolating two concrete elements from relative movement.

B. Saw cut or tool in control joints within 12 hours of placement. Use 3/16 inch thick blade, cutting 1/4 into depth of slab thickness.

C. Review locations of joints when indicated and make recommendations for any additional joints or suggestions for new locations. Lack of joints or misplacement of joints will not constitute justification of slab cracking.

D. Provide joints per joint layout plan on structural drawings.

E. Where indicated on the drawings, separate slabs from vertical surfaces with joint filler. Extend joint filler from bottom of slab to within 1/4 inch of finished slab surface.

3.6 FLOOR SLAB JOINT FILLING, DENT AND CRACK REPAIR

A. Prepare, clean, and install joint repair material according to manufacturer's written instructions.

B. Defer joint filling, dent and crack repair until concrete has aged a minimum of 60 days.

C. Remove dirt, debris, saw cuttings, curing compounds, and sealers from joints; leave contact faces of joint clean and dry.

D. Mechanically V-groove as necessary all saw cuts, joints and cracks, to a minimum width of 1/4 inch and a minimum depth of 5/8 inch.

E. Fill bottom of joint at slab on grade locations to a depth of at least 3/16 inch with semi-rigid epoxy. Omit semi-rigid epoxy at above grade slab locations.

F. Place silica sand over epoxy filler.

G. Prepare and prime joint substrate as recommended by joint repair material manufacturer.

H. Fill all saw cuts, joints, and cracks with cement based joint repair material to top of concrete surface.

I. Steel trowel edges of joint repair material to a feather edge to match adjacent floor elevation.

3.7 FINISHING OF FORMED SURFACES

A. Rough form finish:

1. Leave surfaces with the texture imparted by forms, except patch tie holes and defects.

2. Remove fins exceeding 1/4 inch in height.

3. Use for below grade foundation walls and concealed spaces.

B. Smooth form finish:

1. Coordinate as necessary to secure form construction using smooth, hard, uniform surfaces, with number of seams kept to a practical minimum and in a uniform and orderly pattern.

2. Patch tie holes and defects.

3. Remove fins completely.

4. Use for exposed finish surfaces to receive paint.

C. Smooth rubbed finish:

1. Produce on newly hardened concrete no later than the day following form removal.

2. Wet the surfaces, and rub with carborundum brick or other abrasive until uniform color and texture are produced.

3. Do not use a cement grout other than the cement paste drawn from the concrete itself by the rubbing process.

4. Use for exposed finish surfaces to receive clear sealer.

D. Grout cleaned finish:

1. Do not start cleaning operations until all contiguous surfaces to be cleaned are completed and accessible.

2. Do not permit cleaning as the work progresses.

3. Mix one part Portland cement and 1-1/2 parts fine sand with sufficient water to produce a grout having the consistency of thick paint.

4. Wet the surface of the concrete sufficiently to prevent absorption of water from the grout and apply the grout uniformly with brushes or spray gun.

5. Immediately after applying the grout, scrub the surface vigorously with a cork float or stone to coat the surface and fill all air bubbles and holes.

6. While the grout is still plastic, remove all excess grout by working the surface with a rubber float, sack, or other means.

7. After the surface whites from drying (about 30 minutes at normal temperatures), rub vigorously with clean burlap.

8. Keep the surface damp for at least 36 hours after final rubbing.

9. Use for repair of exposed finish surfaces to receive paint or clear sealer and for exposed to view exterior foundation stem walls..

3.8 FINISHING SLABS

A. Uniformly spread, screed and consolidate concrete. Do not spread concrete by vibration.

B. Float Finish: Float with hand float or with a powered disc float. High spots to be cut down and low spots to be filled. Use as preparation for further finishing.

C. Troweled Finish: After floating, steel trowel to smooth, mark free surface. Use for exposed floors and slabs to receive carpeting resilient flooring and where indicated. Do not over trowel or burnish surface.

D. Polished Concrete Finish: As specified in Section 03 35 10.

E. Broom Finish: Rooms 122, 123 and patio. Patio to receive sealer.

3.9 SLAB TOLERANCES

A. Maintain slab tolerance as defined in ACI 302.1R of (SOV) F_F35 and F_L25 and (MLV) F_F24 and F_L17 as measured by ASTM E1155 for slabs on grade.

B. Correct the slab surface if the actual F_F/F_L number for the floor installation measures less than required.

C. After correction of slab surface to specified tolerance, apply curing, hardening and vapor barrier over corrected surface.

D. In areas of floor drains, maintain floor levels at the walls and slope surface uniformly to drains at 1/8 inch per foot.

3.10 CURING

A. Moist cure concrete with potable water per ACI 301using the following method:

1. Spraying: Fog spray clean, potable water over floor slab areas and maintain moist for 10 days.

2. Polyethylene Film: Spread over floor slab areas, lap edges and sides, maintain in place for 10 days. Remove polyethylene film as required to spray with water to maintain a moist condition. Replace film after spraying.

3.11 SEALING

A. Apply sealing compound on finished floor slab surfaces that are not to receive a finished floor covering and are indicated to be exposed and sealed.

B. Apply sealing compound immediately following finishing operation.

C. Apply sealing compound in sufficient quantities to keep entire surface wet for a minimum of 30 minutes.

D. Lightly mist surface with water as compound is absorbed into surface.

E. Flush surface with water and squeegee surface free of excess compound.

F. Burnish final concrete surface with propane burnisher.

3.12 PATCHING

A. Notify Architect immediately upon removal of forms to determine areas that will require patching.

B. Surface defects shall include color and texture irregularities, stains, cracks, spalls, air bubbles, honeycombs, rock pockets, fins and other projections and discolorations in the surface that cannot be removed by cleaning.

C. Patch imperfections in accordance with ACI 301.

3.13 DEFECTIVE CONCRETE

A. Modify or replace concrete not conforming to required levels and lines, details, and elevations.

B. Repair or replace concrete not properly placed or of the specified type.

3.14 FIELD QUALITY CONTROL

A. Field inspection and testing will be performed under provisions of District’s Division 01 General Requirements.

B. Owner's Inspector will take cylinders and perform slump and air entrainment tests in accordance with ACI 301 and will arrange for pick-up by Testing Laboratory.

C. Three cylinders will be taken for every 50 yards, or fraction thereof, for each class of concrete for each day.

D. Tests of cement and aggregates will be performed by Testing Laboratory to ensure conformance with requirements stated herein.

E. Slab tolerance as measured by ASTM E1155 shall be performed within 72 hours of floor slab installation.

F. Maintain records of placed concrete items. Record date, location of pour, quantity, air temperature, and test samples taken.

3.15 PROTECTION

A. Protect finished work under provisions of District's Division 01 General Requirements.

B. Immediately after placement, protect concrete from premature drying, excessively hot or cold temperatures, and mechanical injury.

C. Maintain concrete with minimal moisture loss at relatively constant temperature for period necessary for hydration of cement and hardening of concrete.

END OF SECTION

SECTION 03 35 10 POLISHED CONCRETE FLOOR SYSTEM

1. PART 1 GENERAL

1.1 SECTION INCLUDES

A. Polished concrete floor system.

B. Joint filler.

C. Application schedule.

1.2 REFERENCES

A. ANSI / NFSI B101.3 Wet Dynamic COF (coefficient of friction) Standard.

B. ASTM D 523 – Standard Test Method for Specular Gloss.

C. ASTM E 1155 – Standard Test Method for Determining FF Floor Flatness and FL Floor Levelness Numbers.

D. CPC - Concrete Polishing Council - Affiliate of the American Society of Concrete Contractors.

1.3 SYSTEM DESCRIPTION

A. Polished concrete floor system for new existing interior concrete floors by dry grinding and polishing with various size grit metal-bonded and resin-bonded diamonds and application of concrete densifier.

B. Performance Requirements: Polished concrete floor system shall meet the following criteria:

1. Static Coefficient of Friction, ANSI / NFSI B101.3 COF Test:

(a) Wet or Dry Surface: 0.41 average Ra value.

2. Specular Gloss/Reflectance, ASTM D 523:

(a) 20 Degrees: 1.2.

(b) 60 Degrees: 2.5.

(c) 85 Degrees: 0.03.

3. Floor Surface Profile, ASTM E 1155:

(a) Floor Flatness, Minimum Local Value (MLV FF): FF 24

(b) Floor Levelness, Minimum Local Value (MLV FL): FL 17

1.4 SUBMITTALS

A. Submit product data and installation instructions under the provisions of Section 01 33 00.

B. Product Data: Submit product data for densifier sealers and joint filler.

C. Instructions: Submit instructions for surface preparation and installation.

1.5 OPERATIONS AND MAINTENANCE DATA

A. Submit maintenance data under provisions of Section 01 77 00.

B. Maintenance Manual: Submit maintenance manual, including maintenance and cleaning instructions for polished concrete floor system.

1.6 QUALITY ASSURANCE

A. Installer's Qualifications: Certified CPC installer with a minimum of 5 years experience..

B. Installer's Certification: Submit CPC certification for installer and installer's employees.

C. Installer's Project References: Submit list of successfully completed polished concrete floor system projects, including project name and location, name of architect, and type and quantity of polished concrete floor system installed.

1.7 PRE-INSTALLATION CONFERENCE

A. Convene pre-installation meeting two weeks prior to commencing installation of polished concrete floor system under the provisions of Section 01 31 00.

B. Require attendance of parties directly affecting work of this Section.

C. Review surface preparation, installation, field quality control, and protection.

1.8 MOCKUP

A. Provide mockup of polished floor system under provisions of Section 01 43 00.

B. Provide a minimum of a 10'-0" x 10'-0" floor area for review.

C. When accepted, mockup will demonstrate minimum standard for the Work. Mockup may remain as part of the Work.

1.9 SEQUENCING AND SCHEDULING

A. Sequence and schedule Work under provisions of Section 01 11 00.

B. Schedule Work to avoid prolonged exposure to future Work that may be detrimental to the finish work of this Section.

1.10 DELIVERY, STORAGE, AND HANDLING

A. Deliver, store and protect products to site under provisions of Section 01 61 00.

B. Deliver materials to site in manufacturer's original, unopened containers and packaging, with labels clearly identifying product name and manufacturer.

C. Store materials in clean, dry area indoors in accordance with manufacturer's instructions.

D. Protect materials during handling and application to prevent contamination or damage.

2. PART 2 PRODUCTS

2.1 INSTALLATION EQUIPMENT

A. Roto-Miller Planing Machine:

1. Type: Self-propelled, vertically rotating concrete planning machine

2. Weight: 700 pounds minimum

3. Grinding Width: 13 inches minimum

4. Motor: 15HP minimum

5. Cutting Disk Diameter: 10 inches minimum

B. Floor Grinder:

1. Type: Multi-orbital, planetary-action, opposing-rotational, diamond-headed floor grinder.

2. Weight: 850 pounds minimum.

3. Grinding Pressure: 675 pounds minimum.

4. Grinding Width: 32 inches minimum.

5. Motor: 15 HP minimum.

6. RPM: 1,750 maximum.

7. Head: 3-head system contours to floor surface.

C. Vacuum System:

1. Type: As required to perform required dust extraction during grinding and polishing of concrete floor.

2. Filtration: Direct-connect, HEPA filtration system.

D. Diamond Tooling for Grinding and Aggregate Exposure

1. 16/30/40 grit 10 inch diamond blade.

E. Diamond Tooling for Coating Removal:

1. 40-grit metal-bonded diamonds.

2. 80-grit metal-bonded diamonds.

F. Diamond Tooling for Initial Grinding:

1. 150-grit metal-bonded diamonds.

G. Diamond Tooling to Prepare Floor for Polishing:

1. 150-grit metal-bonded diamonds.

H. Diamond Tooling for Polishing Concrete:

1. Level 2 - 100, 200 and 400 grit resin-bonded diamonds.

2. Level 3 - 400 grit resin-bonded diamonds.

2.2 MATERIALS

A. Permanent sealing, densifying, and hardening compound that is odorless and free of all VOCS.

B. Concrete Densifier:

1. Ameripolish, Inc., 3DHS Densifier, www.ameripolish.com.

2. Ardex, PC 50, Lithium Densifier, www.ardexamericas.com.

3. Diamatic, FlorSil, Lithium Densifier, www.diamaticusa.com.

4. Concrete Polishing Solutions , Armor Densifier MFL, www.go2cps.com.

5. L & M Construction Chemicals, Inc., FGS Hardener Plus, www.lmcc.com.

6. Perfect Polish, Impregnating Concrete Hardener, www.perfectpolishonline.com.

7. ProSoCo, Consolideck LS, www.consolideck.com.

8. Westcoat, SC-21 Lithium Silicate Densifier, www.westcoat.com.

C. Concrete Sealer:

1. Ameripolish, Inc., SR-2 Stain Resistor, www.ameripolish.com.

2. Ardex, PC Finish, www.ardexamericas.com.

3. Diamatic, Flor-Finish, www.diamaticusa.com.

4. Concrete Polishing Solutions, Armor Stain Shield MFL, www.go2cps.com

5. L & M Construction Chemicals, Inc., FGS PermaShine Petrotext, www.lmcc.com

6. Perfect Polish, Impregnating Concrete Hardener, www.perfectpolishonline.com

7. ProSoCo, Consolideck , LS Guard, www.consolideck.com.

8. Westcoat, SC-24 Polish Guard, www.westcoat.com.

D. Joint Filler: Semi-rigid, two-part, self-leveling 100 percent polyurea joint filler. Spal-Pro RS 88 as manufactured by Metzger / McGuire, www.metzgermcguire.com.

E. Substitutions: Under provisions of Section 01 25 13.

3. PART3 EXECUTION

3.1 EXAMINATION

A. Examine floor to receive polished concrete floor system.

B. Notify Architect of conditions that would adversely affect installation or subsequent use.

C. Do not begin surface preparation or installation until unacceptable conditions are corrected.

3.2 SURFACE PREPARATION

A. Protection: Protect surrounding areas and adjacent surfaces from the following:

1. Minimal accumulation of dust from grinding and polishing.

2. Contact with overspray of concrete densifier.

3. Contact with overspray of concrete sealer.

B. Surface Preparation: Prepare surfaces in accordance with installer's instructions.

C. Clean Surfaces: Remove dirt, dust, debris, oil, grease, curing agents, bond breakers, paint, coatings, and other surface contaminants which could adversely affect installation of polished concrete floor system.

3.3 INSTALLATION

A. Install polished concrete floor system in accordance with installer's instructions at locations indicated on the Drawings.

B. Aggregate Exposure:

1. Medium Aggregate: Medium course aggregate exposure.

C. Polished Concrete Floor System: CPC Sheen Level 2 – Low Sheen.

1. Preparation Step:

a. Remove existing floor coatings and level floor by grinding with 40-grit metal-bonded diamonds.

b. Open-up concrete to accept concrete densifier by grinding with 80-grit metal-bonded diamonds.

2. Apply concrete densifier to deeply saturate floor.

3. Remove residue of concrete densifier dried on floor surface by grinding with 150-grit metal-bonded diamonds.

4. Floor Closure Polishing:

a. Remove 150-grit metal-bonded diamond scratches by grinding with 100-grit resin-bonded diamonds.

b. Remove 150-grit metal-bonded and 100-grit resin-bonded diamond scratches by grinding with 200-grit resin-bonded diamonds.

c. Achieve matte or low-luster finish by grinding with 400-grit resin-bonded diamonds.

5. Apply concrete sealer.

D. Polished Concrete Floor System: CPC Sheen Level 3 – High Sheen.

1. Preparation Step:

a. Begin aggregate exposure grind by running roto-miller planing machine with a maximum setting of 1/8 inch removal per pass, leaving a profiled surface.

b. Remove profile left by roto-miller planing machine by grinding with 16-grit metal-bonded diamonds.

c. Inspect the concrete surface to determine the consistency of aggregate exposed. If the aggregate is unacceptable, repeat steps a and b, removing no more than 1/8 inch of surface per pass.

d. Remove existing floor coatings and level floor by grinding with 40-grit metal-bonded diamonds.

e. Open-up concrete to accept concrete densifier by grinding with 80-grit metal-bonded diamonds.

2. Apply concrete densifier to deeply saturate floor.

3. Remove residue of concrete densifier dried on floor surface by grinding with 150-grit metal-bonded diamonds.

4. Floor Closure Polishing:

   a. Remove 150-grit metal-bonded diamond scratches by grinding with 100-grit resin-bonded diamonds.

   b. Remove 150-grit metal-bonded and 100-grit resin-bonded diamond scratches by grinding with 200-grit resin-bonded diamonds.

   c. Prepare floor for polishing by grinding with 400-grit resin-bonded diamonds.

   d. Achieve light-reflective finish when viewed from a distance of 30 feet by grinding with 800-grit resin-bonded diamonds.

5. Apply concrete sealer.

3.4 JOINT FILLER INSTALLATION

A. Defer installation until a minimum of 28 days after slab installation.

B. Where joints have minor edge chips, said chips shall be squared-off and filled along with the joint itself.

C. Install filler material according to manufacturer's instructions. Coordinate with polishing operations.

D. Thoroughly clean all joints to their full depth. Remove all dust and debris.

E. Install backer rod in construction joints at a minimum depth of 2 inches. Do not install backer rod in saw-cut control joints.

F. Fill joints to slightly overflowing condition. After filler is fully cured, razor cut off excess to flush profile.

3.5 FIELD QUALITY CONTROL

A. Inspect completed polished concrete floor system with Owner, Contractor, Architect, and Installer.

B. Review procedures with Architect to correct unacceptable areas of completed polished concrete floor system.

3.6 PROTECTION

A. Protect completed polished concrete floor system from damage until Substantial Completion.

   1. Do not allow vehicle and pedestrian traffic on unprotected floor.

   2. Do not allow construction materials, equipment, and tools on unprotected floor.

B. Immediately remove mortar splatter, spilled liquids, oil, grease, paint, coatings, and other surface contaminants which could adversely affect completed polished concrete floor system.

C. Repair damaged areas of completed polished concrete floor system to satisfaction of Architect.

3.7 APPLICATION SCHEDULE

A. Refer to floor finish plans on Sheet A10.1 for the specified sheen level.

END OF SECTION 03 35 10

SECTION 04 05 13 MASONRY MORTAR

1. PART 1 GENERAL

1.1 SECTION INCLUDES

A. Mortar and grout for masonry.

1.2 REFERENCES

A. CBC - California Building Code, (CCR) California Code of Regulations , Title 24, Part 2.

B. ASTM C144 - Aggregate for Masonry Mortar.

C. ASTM C150 - Portland Cement.

D. ASTM C207 - Hydrated Lime for Masonry Purposes.

E. ASTM C270 - Mortar for Unit Masonry.

F. ASTM C404 - Aggregates for Masonry Grout.

G. ASTM C476 - Grout for Masonry.

H. ASTM C618 - Standard Specification for Coal Fly Ash and Raw or Calcined Natural Pozzolan for use as a Mineral Admixture for Concrete.

1.3 STORAGE AND HANDLING

A. Maintain packaged materials clean, dry, and protected against dampness, freezing, and foreign matter.

1.4 ENVIRONMENTAL REQUIREMENTS

A. Maintain materials and surrounding air temperatures to minimum 40 degrees F prior to, during, and 48 hours after completion of masonry work.

1.5 MIX DESIGN

A. Submit design mix prepared by a California Registered Civil Engineer to testing laboratory and Architect for review.

2. PART 2 PRODUCTS

2.1 MATERIALS

A. Portland Cement: ASTM C150, Type I, low alkali, gray color.

B. Mortar Aggregate: ASTM C144, standard masonry type, non reactive.

C. Hydrated Lime: ASTM C207, Type S.

D. Grout Aggregate: ASTM C404.

E. Fly Ash: ASTM C618, Class F.

F. Water: Clean and potable.

2.2 MORTAR MIXES

A. Comply with ASTM C270, Proportion Specification. Limit fly ash content to 15 percent maximum.

1. Mortar for masonry below grade and in contact with earth: Type M.

2. Mortar for reinforced masonry: Type S.

3. Pointing Mortar: Type N, with maximum 2 percent ammonium stearate or calcium stearate per cement weight.

4. Mortar for glass unit masonry: Type S.

2.3 MORTAR MIXING

A. Thoroughly mix mortar ingredients in quantities needed for immediate use.

B. Do not use anti-freeze compounds to lower the freezing point of mortar.

C. If water is lost by evaporation, retemper only within 2 hours of mixing.

D. Use mortar within two hours after mixing at temperatures of 80 degrees F, or 2-1/2 hours at temperatures under 40 degrees F.

E. Mortar which has hardened or stiffened due to hydration of cement shall not be used.

2.4 GROUT MIXES

A. Comply with ASTM C 476 for grout in reinforced and non-reinforced unit masonry: 2000 psi strength at 28 days.

1. Fine Grout: spaces less than 2 inches in horizontal dimension.

2. Coarse Grout: spaces 2 inches or more in least horizontal dimension.

3. Mix 1 lb of grout aid per 100 lbs of cementitious materials.

4. Limit fly ash content to 25 percent maximum.

2.5 GROUT MIXING

A. Thoroughly mix grout ingredients in quantities needed for immediate use in accordance with ASTM C476.

B. Do not use anti-freeze compounds to lower the freezing point of grout.

3. PART 3 EXECUTION

3.1 PREPARATION

A. Plug cleanout holes with masonry units to prevent leakage of grout materials. Brace masonry for wet grout pressure.

3.2 INSTALLATION

A. Install mortar and grout to requirements of the specific masonry Section.

B. Work grout into masonry cores and cavities to eliminate voids.

C. Do not displace reinforcement while placing grout.

D. Remove grout spaces of excess mortar.

END OF SECTION

SECTION 04 20 00 UNIT MASONRY

1. PART 1 GENERAL

1.1 SECTION INCLUDES

A. Concrete masonry units.

B. Reinforcement, anchorage, and accessories.

1.2 REFERENCES

A. ASTM C90 - Load-Bearing Concrete Masonry Units.

B. UL - Underwriters' Laboratories.

C. MSJC - Masonry Standards Joint Committee (ACI 530/ASCE 5/TMS 402).

1.3 STORAGE, AND HANDLING

A. Store and protect products under provisions of Section 01 61 00.

1.4 SEQUENCING AND SCHEDULING

A. Coordinate work under provisions of Section 01 31 00.

2. PART 2 PRODUCTS

2.1 MANUFACTURERS - CONCRETE MASONRY UNITS

A. Angelus Block, Co., Inc. www.angelusblock.com.

B. RCP Block and Brick, Inc., www.rcpblock.com.

C. Substitutions: Under provisions of Section 01 25 13.

2.2 CONCRETE MASONRY UNITS

A. Hollow Load Bearing Block Units: ASTM C90, medium weight. Masonry units shall be single or double open end units as required for proper installation.

B. Provide single, double, and triple faced units as required for all exposed surfaces:

1. Precision Units: Standard 8 x 8 x16 units, provide at all exterior free-standing walls. See site plan for locations. Provide in grey color.

2. Cap Blocks: Provide 2 inch thick solid units at all locations indicated on drawings. Provide in grey color.

2.3 MORTAR AND GROUT

A. Mortar: Type specified in Section 04 05 13.

B. Grout: Type specified in Section 04 05 13.

2.4 REINFORCEMENT AND ANCHORAGE

A. Reinforcing Steel: Type specified in Section 03 20 00; sizes indicated.

B. Anchors: Types and sizes indicated and required for intended use.

2.5 ACCESSORIES

A. Cleaning Solutions: Non-acidic, not harmful to masonry work or adjacent materials.

B. Joint Filler: ASTM D1056, Type 2, Class A, Grade 1, closed cell neoprene oversized 35 percent to joint width.

3. PART 3 EXECUTION

3.1 EXAMINATION

A. Verify that field conditions are acceptable and are ready to receive work.

B. Verify items provided by other Sections of work are properly sized and located.

C. Beginning of installation means installer accepts existing conditions.

3.2 PREPARATION

A. Direct and coordinate placement of metal anchors supplied by other Sections.

B. Provide temporary bracing during installation of masonry work. Maintain in place until building structure provides permanent bracing.

3.3 COURSING

A. Establish lines, levels, and coursing indicated. Protect from displacement.

B. Maintain masonry courses to uniform dimension. Form vertical and horizontal joints of uniform thickness.

C. Lay concrete masonry units in running bond.

3.4 PLACING AND BONDING

A. Lay hollow masonry units with face shell bedding on head and bed joints.

B. Buttering corners of joints or excessive furrowing of mortar joints are not permitted.

C. Remove excess mortar as Work progresses.

D. Interlock intersections and external corners.

E. Intersections of perpendicular walls to be flush. Rake joint at exposed unit faces for placement of backer rod and sealant.

F. Do not shift or tap masonry units after mortar has achieved initial set. Where adjustment must be made, remove mortar and replace.

G. Perform job site cutting of masonry units with proper tools to provide straight, clean, unchipped edges. Prevent broken masonry unit corners or edges.

3.5 REINFORCEMENT

A. Support and secure reinforcing bars from displacement. Maintain position within 1/2 inch of dimensioned position.

3.6 REINFORCED UNIT MASONRY

A. Lay masonry units with core cells vertically aligned clear of mortar and unobstructed.

B. Place mortar in masonry unit bed joints back 1/4 inch from edge of unit grout spaces, bevel back and upward. Permit mortar to cure 3 days before placing grout for high lift grouting.

C. Reinforce masonry unit cores with reinforcement bars and grout as indicated.

D. Retain vertical reinforcement in position at top and bottom of cells and at intervals not exceeding 160 bar diameters. Do not splice between lateral support unless otherwise indicated.

E. Brace reinforcement and secure in place to allow no movement during grouting.

F. Grouting:

1. Use Fine Grout per Section 04 05 13 for filling spaces less than 2 inches in one or both horizontal directions.

2. Use Coarse Grout per Section 04 05 13 for filling spaces 2 inches or larger in both horizontal directions.

3. Grouting Technique: Low-lift grouting technique subject to requirements specified below. Optional high lift grouting technique may be used subject to requirements specified below.

G. Low-Lift Grouting:

1. Provide minimum clear dimension of 2 inch and clear area of 8 sq. in. in vertical cores to be grouted.

2. Place vertical reinforcement prior to laying of masonry units. Extend above elevation of maximum pour height as required for splicing.

3. Lay masonry units to maximum pour height. Do not exceed 12'-8" height, or if bond beam occurs below this height, stop pour at course below bond beam.

4. Pour grout using chute or container with spout. Rod or vibrate grout during placing. Place grout continuously; do not interrupt pouring of grout for more than 1 hour. Terminate grout pours 1-1/2 inches below top course of pour.

5. Bond Beams: Stop grout in vertical cells 1-1/2 inches below bond beam course. Place horizontal reinforcement in bond beams; lap at corners and intersections as shown. Place grout in bond beam course before filling vertical cores above bond beam.

H. High-Lift Grouting:

1. Do not use high-lift grouting technique for grouting unless minimum cavity dimension and area is inch and 10 sq.in., respectively.

2. Provide cleanout holes in first course at all vertical cells which are to be filled with grout. Use units with one face shell removed and provide temporary supports for units above, or use header units with concrete brick supports, or cut openings in one face shell.

3. Construct masonry to full height of maximum grout pour specified, prior to placing grout. Limit grout lifts to a maximum height of 6 feet and grout pour to a maximum height of 24'-0", for single wythe hollow masonry walls, unless otherwise indicated.

4. Place vertical reinforcement before grouting. Place before or after laying masonry units, as required by job conditions. Tie vertical reinforcement to dowels at base of masonry where shown and thread masonry over or around reinforcement.

5. Place horizontal beam reinforcement as the masonry units are laid.

6. Preparation of Grout Spaces: Prior to grouting, inspect and clean grout spaces. Remove dust, dirt, mortar droppings, loose pieces of masonry and other foreign materials from grout spaces. Clean reinforcement and adjust to proper position. Clean top surface of structural members supporting masonry to ensure bond. After final cleaning and inspection, close cleanout holes and brace closures to resist grout pressures.

7. Do not place grout until entire height of masonry to be grouted has attained sufficient strength to resist displacement of masonry units and breaking of mortar bond. Install shores and bracing, if required, before starting grouting operations.

8. Limit grout pours to sections which can be completed in one working day with not more than one hour interruption of pouring operation. Place grout in lifts which do not exceed 4 feet. Allow not less than 30 minutes, or more than one hour between lifts of a given pour. Vibrate each grout lift during pouring operation. Place grout in lintels or beams over openings in one continuous pour.

9. Where bond beam occurs more than one course below top of pour, fill bond beam course to within 1 inch of vertically reinforced cavities, during construction of masonry.

10. When more than one pour is required to complete a given section of masonry, extend reinforcement beyond masonry as required for splicing. Pour grout to within 1-1/2 inches of top course of first pour. After grouted masonry is cured, lay masonry units and place reinforcement for second pour section before grouting. Repeat sequence if more pours are required.

3.7 TOLERANCES

A. Maximum Variation From Unit to Adjacent Unit: 1/16 inch.

B. Maximum Variation From Plane of Wall: 1/4 inch in 10 feet and 1/2 inch in 20 feet or more.

C. Maximum Variation From Level Coursing: 1/8 inch in 4 feet and 1/4 inch in 12 feet maximum.

D. Maximum Variation of Joint Thickness: 1/8 inch in 4 feet.

E. Maximum Variation From Cross Sectional Thickness of Walls: 1/4 inch.

3.8 FIELD QUALITY CONTROL

A. Field inspection and testing will be performed under provisions of Section 01 45 29.

3.9 CLEANING

A. Clean work under provisions of Section 01 77 00.

B. Remove excess mortar and mortar smears as work progresses.

C. Replace defective mortar. Match adjacent work.

D. Clean soiled surfaces with non-acid cleaning solution.

E. Use non-metallic tools in cleaning operations.

3.10 PROTECTION OF FINISHED WORK

A. Protect finished installation under provisions of Section 01 61 00.

B. At the end of each days work and during times of inclement weather cover top of masonry wall with polyethylene sheeting. Extend covering down each side of wall for a distance of 2 feet minimum. Secure in place to avoid displacement.

C. Without damaging completed work, provide protective boards at exposed external corners which may be damaged by construction activities.

END OF SECTION 04 20 00

SECTION 04 73 00 MANUFACTURED STONE MASONRY

1. PART 1 GENERAL

1.1 SECTION INCLUDES

A. Manufactured stone veneer.

B. Trim shapes.

C. Mortar.

D. Metal lath.

E. Underlayment.

F. Anchorage, and accessories.

1.2 REFERENCES

A. ASTM C847 - Standard Specifications for Metal Lath.

B. ASTM C932 - Surface-Applied Bonding Agents for Exterior Plaster.

C. ASTM C1063 - Installation of Lathing and Furring for Portland Cement Based Plaster.

D. CBC - California Building Code, (CCR) California Code of Regulations, Title 24, part 2.

E. MSJC - Masonry Standards Joint Committee (ACI 530/ASCE 5/TMS 402).

F. NAAMM - Standard ML/SFA 920 - Guide Specifications for Metal Lathing and Furring.

G. UL 723 - Test for Surface Burning Characteristics of Building Materials.

H. TSIB - Technical Service and Information Bureau.

1.3 SUBMITTALS

A. Submit product data under provisions of Section 01 33 00.

B. Submit product data for stone veneer units and accessories.

C. Submit samples under provisions of Section 01 33 00.

D. Submit two samples of stone veneer units to illustrate color, texture and extremes of color range.

E. Submit manufacturer's installation instructions under provisions of Section 01 33 00.

F. Provide underlayment manufacturer’s written installation instructions.

1.4 REGULATORY REQUIREMENTS

A. Conform to CBC – California Building Code, (CCR) California Code of Regulations, Title 24, Part 2, Chapter 14.

1.5 QUALITY ASSURANCE

A. Installer: Company specializing in performing the work of this Section with minimum five years documented experience.

B. Installation of underlayment and penetration flashing shall be in accordance with manufacturer's installation guidelines and recommendations. Provide site reports from manufacturer's field service representative, indicating observation of underlayment and flashing installation.

1.6 MOCK-UP

A. Provide mock-up of stone veneer wall under provisions of Section 01 43 00.

B. Erect stone veneer to 3 x 4 feet panel size, include specified mortar, attachments and accessories.

C. When accepted, mock-up will demonstrate minimum standard for the Work. Mock-up may remain as part of the Work.

1.7 PRE-INSTALLATION CONFERENCE

A. Convene a conference two weeks prior to commencing work of this Section under the provisions of Section 01 31 00.

B. Require the attendance of parties directly affecting the Work of this Section.

C. Review requirements for installation of all materials specified in this Section for sequencing, proper installation, integration and protection.

1.8 DELIVERY, STORAGE, AND HANDLING

A. Deliver, store and protect products to site under provisions of Section 01 61 00.

B. Accept stone units on site. Inspect for damage.

1.9 ENVIRONMENTAL REQUIREMENTS

A. Weather Requirements: MSJC - Masonry Standards Joint Committee, Hot and Cold weather Masonry Construction Manual (ACI 530/ASCE 5/TMS 402).

1.10 SEQUENCING AND SCHEDULING

A. Coordinate work under the provisions of Section 01 31 00.

1.11 WARRANTY

A. Provide ten year warranty for underlayment and flashings under provisions of Section 01 77 00.

B. Warranty: Include coverage for published water infiltration properties of underlayment and flashings installed for exterior walls and openings.

2. PART 2 PRODUCTS

2.1 MANUFACTURERS - STONE VENEER

A. Coronado Stone, www.coronado.com.

B. Substitutions: Under provisions of Section 01 25 13.

2.2 STONE VENEER

A. Stone: Sawtooth Ledge - Vista Pointe as manufactured by Coronado Stone Products.

B. Thickness: 1 inch average, from 3" to 6" in height and up to 20" in length.

C. Weight: 8 to 10 lb/sq ft.

D. Trim Shapes:

1. Watertable/Sill.

2. Wainscot Cap.

E. Fire Hazard Classification: Flame spread of O, smoke development of O in accordance with UL723.

2.3 MANUFACTURERS - LATHING MATERIALS

A. Lathing Materials:

1. Amico-West, www.amico-lath.com.

2. CEMCO, www.cemcosteel.com.

3. ClarkDietrich Building Systems, www.clarkdietrich.com

4. Clark Western Building Systems, www.westsidebmc.com.

B. Accessories:

1. Amico-West, www.amico-lath.com.

2. CEMCO, www.cemcosteel.com.

3. ClarkDietrich Building Systems, www.clarkdietrich.com.

4. Clark Western Building Systems, www.westsidebmc.com.

5. Stockton Wire Products, www.stocktonproducts.com.

C. Substitutions: Under provisions of Section 01 25 13.

2.4 FURRING AND LATHING

A. Metal Lath for Vertical Surfaces: ASTM C847, 3.4 lb/sq yd expanded metal, galvanized, self furring type with continuous groove.

B. Underlayment:

1. Underlayment: Tyvek as manufactured by E.I. DuPont de Nemours, www.tyvek.com

(a) First layer: Commercial Wrap D.

(b) Second layer: Commercial Wrap.

C. Substitutions: Under provisions of Section 01 25 13.

2.5 ACCESSORIES

A. Weep Screed: Equivalent to Stockton WS#7, minimum 0.0179 inch thick; depth governed by plaster thickness, minimum 3-1/2 inch high flange, "V" shaped, of longest possible lengths; galvanized finish.

B. Anchorages: Nails, staples, or other approved metal supports, of type and size to suit application, galvanized to rigidly secure lath and associated metal accessories in place.

C. Penetration Flashing: Tyvek flashing system. Straight Flash for jambs and heads, Flex Wrap for sills. Equivalent as manufactured by National Shelter Products, Inc.

D. Tape: Acrylic adhesive backed oriented polypropylene, 3 inch wide.

E. Bonding Agent: ASTM C932; type recommended for bonding plaster to concrete and concrete masonry surfaces. Larsen Products Corp. - Weld-Crete, www.larsenproducts.com.

F. Cleaning Solution: Non-acid, not harmful to stone veneer or adjacent materials.

G. Water Repellent: As specified in Section 07 19 00.

H. Substitutions under provisions of Section 01 25 13.

2.6 MORTAR AND GROUT

A. Types as specified in Section 04 05 13.

2.7 FLASHINGS

A. Flexible Flashing: 5 oz/sq.ft. sheet copper coated both sides with fabric.

1. Multi-Flash 500 manufactured by York Manufacturing, www.yorkmfg.com.

2. Copper Fabric Flashing manufactured by Advanced Building Products, www.advancedbuildingproducts.com.

3. Copper Fabric Flashing manufactured by Sardell Manufacturing Co., Inc., www.h-b.com.

B. Substitutions: Under provisions of Section 01 25 13.

3. PART 3 EXECUTION

3.1 INSPECTION

A. Verify that field conditions are acceptable and are ready to receive work.

B. Verify items provided by other sections of work are properly sized and located.

C. Concrete: Verify joints are cut flush and surface is ready to receive work of this Section. Verify no bituminous or water repellent coatings exist on surface.

D. Grounds and Blocking: Verify items within walls for other Sections of work have been installed.

E. Verify that underlayment is in place and ready to receive work of this section.

F. Beginning of installation means installer accepts existing conditions.

3.2 PREPARATION

A. Direct and coordinate placement of metal anchors supplied by other Sections.

B. Clean concrete surfaces of foreign matter. Clean surfaces using acid solutions, solvents, or detergents. Wash surfaces with clean water.

C. Apply bonding agent to masonry concrete in accordance with manufacturer's instructions.

3.3 INSTALLATION - LATHING MATERIALS

A. Install metal lathing in accordance with ML/SFA 920, ASTM C1063 and as specified herein.

B. On vertical surfaces apply 2 layers of underlayment over substrate; weatherlap horizontal edges 6 inches, vertical edges 6 inches. Fasten in place at 12 inches on center vertically over stud. Tape seal all joints and penetrations. Installation to conform to Single " Separate " Layer Method in accordance with TSIB Bulletin 60.220.

C. Install penetration flashing around all openings and penetrations in exterior walls, soffits and ceilings in compliance with underlayment manufacturers recommendations and in conformance with recommendations contained in Plaster and Lathing Systems Manual and ML/SFA 920. Turn sill flashing up 6 inches at jambs. Extend flashing back onto sill, jamb, and head of all openings.

D. Apply metal lath taut, with long dimension perpendicular to supports for vertical surfaces.

E. Lap ends minimum 1 inch. Secure end laps with tie wire where they occur between supports.

F. Lap sides of expanded metal lath minimum 1-1/2 inches. Nest outside ribs of rib lath together.

G. Furr out metal lath from vertical supports or backing not less than 1/4 inch. Furring of metal lath on vertical supports having a bearing surface width of 1-5/8 inches or less is not required.

H. Attach metal lath to wood supports using 1-1/2 inch No. 11 galvanized nails with 7/16 inch diameter heads at maximum 6 inches on center.

I. Attach metal lath to vertical metal supports with tie wires or No. 8 self tapping screws with 3/8 inch diameter wafer head capable of penetrating metal supports by not less than 1/4 inch. Maximum spacing 6 inches on center.

J. Place strip mesh diagonally at corners of lathed openings. Secure rigidly in place.

K. Place 4 inch wide strips of metal lath centered over junctions of dissimilar backing materials. Secure rigidly in place.

L. Place weep screed at base of all vertical plaster applications at foundation line not less than 4 inches above earth or 2 inches above paved surfaces. Underlayment and lath shall cover and terminate on the attachment flange of the screed.

M. Install accessories to lines and levels.

3.4 INSTALLATION - MORTAR BED

A. Apply mortar bed scratch coat over surfaces to a thickness of 1/2 to 3/4 inch.

B. Allow scratch coat to cure for 48 hours.

C. Shall be installed to provide a bond strength with a working shear of 50 PSI.

3.5 PLACING AND BONDING

A. Apply stone working from the bottom up.

B. Apply mortar to back of stone units and press firmly in place.

C. Place units with uniform mortar joint of between 1/2 to 3/4 inch width.

D. Perform necessary cutting with proper tools to provide uniform edges.

E. Rake out mortar joints and brush joints clean to accommodate pointing mortar.

F. Fill joints with pointing mortar. Pack and work into voids. Neatly tool surface to concave joint profile.

3.6 VENEER FLASHINGS

A. Extend flashings under stone veneer, turn up minimum 8 inches and weather lap with underlayment.

B. Install flashing at all window sills, door and window heads, and above shelf angles.

C. Form flashing up into pan at jamb of window sills and at jamb of window and door heads.

D. Lap end joints minimum 6 inches and seal watertight.

E. Use flashing manufacturer's recommended adhesive and sealer.

3.7 FIELD QUALITY CONTROL

A. Field inspection and testing will be performed under provisions of Section 01 45 29.

3.8 CLEANING

A. Clean work under provisions of Section 01 77 00.

B. Remove excess mortar and mortar smears.

C. Replace defective mortar. Match adjacent work.

D. Clean soiled surfaces with cleaning solution.

E. Use non-metallic tools in cleaning operations.

3.9 WATER REPELLANT

A. Apply water repellant as specified in Section 07 19 00.

END OF SECTION 04 73 00

SECTION 05 12 00 STRUCTURAL STEEL FRAMING

1. PART 1 GENERAL

1.1 SECTION INCLUDES

A. Structural steel framing members and support members.

B. Baseplates, and anchor bolts.

C. Grouting under baseplates.

D. Shear stud connectors.

1.2 REFERENCES

A. CBC - California Building Code, (CCR) California Code of Regulations, Title 24, Part 2.

B. ASTM A36 - Carbon Structural Steel.

C. ASTM A53 - Pipe, Steel, Black and Hot-Dipped, Zinc Coated, Welded and Seamless.

D. ASTM A108 - Steel Bars, Carbon, Cold-Finished, Standard Quality.

E. ASTM A307 - Carbon Steel Bolts and Studs, 60,000 psi Tensile Strength

F. ASTM A325 - High Strength Bolts for Structural Steel Joints.

G. ASTM A490 - Structural Bolts, alloy Steel, Heat Treated, 150 ksi Minimum Tensile Strength.

H. ASTM A500 - Cold-Formed Welded and Seamless Carbon Steel Structural Tubing in Round and Shapes.

I. ASTM A992 - Standard Specification for Steel for Structural Shapes for Use in Building Framing.

J. ASTM C1107 - Packaged Dry, Hydraulic Cement Grout (non shrink).

K. ASTM F1554 - Standard Specification for Anchor Bolts, Steel, 36, 55, and 105 KSI Yield Strength.

L. AWS A2.4 - Standard Welding Symbols.

M. AWS D1.1 - Structural Welding Code - Steel.

N. AISC - Specification for the Design, Fabrication and Erection of Structural Steel for Buildings.

O. AISC - Specification for Architectural Exposed Structural Steel.

P. SSPC - The Society for Protective Coatings.

1.3 SUBMITTALS

A. Submit under provisions of District's Division 01 General Requirements.

B. Shop Drawings:

1. Indicate profiles, sizes, spacing, and locations of structural members, connections, cambers and loads.

2. Indicate welded connections with AWS A2.4 welding symbols. Indicate net weld lengths.

3. Provide locations and sizes of all shear stud connectors.

C. Manufacturer's Mill Certificate: Submit under provisions of District's Division 01 General Requirements certifying that products meet or exceed specified requirements.

D. Mill Test Reports: Submit under provisions of District's Division 01 General Requirements, indicating structural strength and destructive and non-destructive test analysis.

E. Welders' Certificates: Submit under provisions of District's Division 01 General Requirements, certifying welders employed on the Work, verifying AWS qualification within the previous 12 months.

1.4 QUALITY ASSURANCE

A. Fabricate structural steel members in accordance with AISC-Specification for the Design, Fabrication and Erection of Structural Steel for Buildings.

B. Perform Work in accordance with AISC - Specification for Architectural Exposed Structural Steel.

1.5 QUALIFICATIONS

A. Design connections not detailed on the Drawings under direct supervision of a Professional Structural Engineer experienced in design of this work and licensed in the State of California.

B. Design connections in accordance with CBC California Building Code, (CCR) California Code of Regulations, Title 24, Part 2, Chapter 22.

2. PART 2 PRODUCTS

2.1 MATERIALS

A. Provide structural steel with a minimum post consumer recycled content of 75 percent.

B. Structural Steel Members: ASTM A36. W and WT shapes, ASTM A992.

C. Structural Tubing: ASTM A500, Grade B.

D. Steel Pipe: ASTM A53, Grade B.

E. Shear Stud Connectors: ASTM A108, Grade 1010 through 1020 inclusive. Connectors shall be free of defects, cracks or bursts deeper than half the thickness from the periphery of the head to the shaft. After welding, studs will be the length shown on the drawings.

F. Threaded Bolts, Nuts, and Washers: ASTM A325.

G. Anchor Bolts: ASTM A307. ASTM F1554 if over 9-1/2 inches long.

H. Welding Materials: AWS D1.1; type required for materials being welded.

I. Grout: ASTM C1107, non-shrink type, pre-mixed compound consisting of non-metallic aggregate, cement, water reducing and plasticizing additives, capable of developing a minimum compressive strength of 7,000 psi at 28 days.

2.2 FABRICATION

A. Fabricate structural steel members in accordance with AISC Specification.

B. Continuously seal joined members by continuous welds. Grind exposed welds smooth.

C. Shear studs shall not be installed in the shop.

2.3 FINISH

A. Prepare structural component surfaces in accordance with SSPC SP-2.

B. Shop and Touch-Up Primer: SSPC 15, Type 1, Red Oxide.

C. Shop prime structural steel members. Do not prime surfaces that will be fireproofed, field welded or in contact with concrete or masonry.

D. Finish: Site paint exposed to view structural steel members under provisions of Section 09 90 00.

2.4 SOURCE QUALITY CONTROL AND TESTS

A. Testing and analysis of components will be performed under provisions of District's Division 01 General Requirements.

3. PART 3 EXECUTION

3.1 EXAMINATION

A. Verify that field conditions are acceptable and are ready to receive work.

B. Beginning of installation means erector accepts existing conditions.

3.2 ERECTION

A. Allow for erection loads, and for sufficient temporary bracing to maintain structure safe, plumb, and in true alignment until completion of erection and installation of permanent bracing.

B. Field weld components indicated on Drawings.

C. Field connect members with threaded fasteners indicated; torque to required resistance.

D. Do not field cut or alter structural members without approval of Architect.

E. After erection, prime welds, abrasions, and surfaces not shop primed, except surfaces to be in contact with concrete.

3.3 GROUTING

A. Clean concrete on masonry bearing surfaces.

B. Roughen bearing surface prior to setting base and bearing plates.

C. Set base and bearing plates on wedges, shims, or setting nuts.

D. Tighten anchor bolts after members are positioned and plumb.

E. Cut off protruding wedges or shims flush with edge of base or bearing plate.

F. Pack grout solidly between bearing surfaces and plates so no voids remain.

G. Finish exposed surfaces, protect installed materials, and allow to cure.

3.4 ERECTION TOLERANCES

A. Erect structural steel members in accordance with AISC Specification.

3.5 FIELD QUALITY CONTROL

A. Field inspection and testing will be performed under provisions of District's Division 01 General Requirements.

END OF SECTION

SECTION 05 31 13 STEEL FLOOR DECKING

1. PART 1 GENERAL

1.1 SECTION INCLUDES

A. Steel floor deck and accessories.

B. Formed steel deck end forms to contain wet concrete.

C. Framing for openings up to and including 16 inches.

D. Bearing plates and angles.

E. Shear stud connectors.

1.2 REFERENCES

A. ASTM A36 - Structural Steel.

B. ASTM A108 - Steel Bars, Carbon, Cold-Finished, Standard Quality.

C. ASTM A653 - General Requirements for Steel Sheet, Zinc-Coated, (Galvanized) or Zinc-Iron Alloy Coated (Galvannealed) by the Hot-Dip Process.

D. ASTM A924 - General Requirements for Steel Sheet, Metallic-Coated by the Hot-Dip Process.

E. AWS D1.1 - Structural Welding Code - Steel.

F. AWS D1.3 - Structural Welding Code - Sheet Steel.

G. ICC-ES - International Code Council Evaluation Service, Inc.

H. SDI - Design Manual for Composite Decks, Form Decks, Roof Decks.

I. SSPC - The Society for Protective Coatings.

1.3 SUBMITTALS

A. Submit under provisions of District's Division 01 General Requirements.

B. Shop Drawings: Indicate decking plan, support locations, projections, openings and reinforcement, pertinent details, and accessories.

C. Product Data: Provide deck profile characteristics and dimensions, structural properties, finishes, and design values.

D. Welders' Certification: Submit certificates that welders employed on the work have met AWS verification within the previous 12 months.

1.4 QUALIFICATIONS

A. Installer: Company specializing in performing the work of this Section with minimum five years documented experience.

B. Design for conditions and loading not detailed on the drawings under direct supervision of a Professional Structural Engineer experienced in design of this work and licensed in the State of California.

1.5 DELIVERY, STORAGE, AND HANDLING

A. Deliver, store and protect products to site under provisions of District's Division 01 General Requirements.

B. Cut plastic wrap to encourage ventilation.

C. Separate sheets and store decking on dry wood sleepers; slope for positive drainage.

1.6 FIELD MEASUREMENTS

A. Verify that field measurements are as shown on shop drawings.

2. PART 2 PRODUCTS

2.1 MANUFACTURERS

A. ASC Steel Deck, ICC-ES No. ESR-1414, www.ascsteeldeck.com.

B. New Millennium Building Systems, ICC-ES No. ESR-1169, www.newmill.com.

C. Epic Metals Corp., IAPMO No. 226, www.epicmetals.com.

D. Verco Manufacturing Co., IAPMO No. 0217, www.vercodeck.com.

E. Vulcraft, ICC-ES No. ESR-1227, www.vulcraft.com.

F. Substitutions: Under provisions of Section 01 25 13.

2.2 MATERIALS

A. Sheet Steel: ASTM A653, SS, Grade 40; with G60 galvanized coating conforming to ASTM A924.

B. Miscellaneous Steel Shapes: ASTM A36 steel, galvanized.

C. Shear Stud Connectors: ASTM A108, Grade 1010 through 1020 inclusive. Connectors shall be free of defects, cracks or bursts deeper than half the thickness from the periphery of the head to the shaft. After welding, studs will be the length shown on the drawings.

D. Welding Materials: AWS D1.1 and AWS D1.3.

E. Touch-Up Primer: SSPC 20.

2.3 ACCESSORIES

A. Flute Closures: Closed cell foam rubber, 1 inch thick; profiled to fit tight to the decking.

B. Metal Closure Strips, Wet Concrete Stops, Cover Plates, and Related Accessories: 16 gage galvanized sheet steel; of profile and size required.

C. Fabricate floor drain pan of 14 gage sheet steel, flat bottom, sloped sides, recessed 1-1/2 inches below floor deck surface, bearing flange 3 inches wide, sealed watertight.

2.4 FABRICATION

A.	Metal Decking	:	Verco B Formlok.
	Span Design	:	Double.
	Minimum Metal Thickness(Excluding Finish)	:	0.0359 inch thick.
	Nominal Height	:	1-1/2 inch.
	Venting	:	Provide factory punched vent tabs to provide 1% ventilation.
	Formed Sheet Width	:	36 inch.
	Side Joints	:	Lock seam.

Flute Sides : Diagonally ribbed for improved concrete bond.

2.5 FINISH

A. Finish: Site paint exposed to view galvanized steel floor deck under provisions of Section 09 90 00.

3. PART 3 EXECUTION

3.1 EXAMINATION

A. Verify that field conditions are acceptable and are ready to receive work.

B. Beginning of installation means installer accepts existing conditions.

3.2 INSTALLATION

A. Erect metal decking in accordance with SDI Design Manual and notes on Structural Drawings.

B. Bear decking on steel supports with 3 inch minimum bearing. Align and level.

C. Fasten deck to steel support members at ends and intermediate supports with fusion welds through weld washers as indicated on the drawings.

D. Weld in accordance with AWS D1.1 and AWS D1.3.

E. Weld male/female side laps as indicated on drawings.

F. Reinforce steel deck openings as shown on the structural drawings.

G. Install 6 inch minimum wide sheet steel cover plates, of same thickness as decking, where deck changes direction. Fusion weld 12 inches oc maximum.

H. To contain wet concrete, install stops unless detailed with steel angles at floor edge upturned to top surface of slab. Provide stops of sufficient strength to remain stationary without distortion.

I. Install sheet steel closures and angle flashings to close openings between deck and walls, columns, and openings.

J. Position floor drain pans with flange bearing on top surface of deck. Fusion weld at each deck flute.

K. Weld stud shear connectors through steel deck to structural members below.

L. Immediately after welding deck and other metal components in position, coat welds, burned areas, and damaged surface coating, with touch-up prime paint.

END OF SECTION

SECTION 05 50 00 METAL FABRICATIONS

1. PART 1 GENERAL

1.1 SECTION INCLUDES

A. Shop fabricated ferrous metal items and prime painted.

B. Schedule of metal fabrications.

1.2 REFERENCES

A. ASTM A36 - Structural Steel.

B. ASTM A53 - Pipe, Steel, Black and Hot-Dipped, Zinc-Coated, Welded and Seamless.

C. ASTM A123 - Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products.

D. ASTM A153 - Zinc Coating (Hot-Dip) on Iron and Steel Hardware.

E. ASTM A307 - Carbon Steel Externally Threaded Standard Fasteners.

F. ASTM A492 - Standard Specification for Stainless Steel Rope Wire.

G. ASTM A500 - Cold-Formed Welded and Seamless Carbon Steel Structural Tubing in Rounds and Shapes.

H. ASTM A780 - Repair of Damaged and Uncoated Areas of Hot-Dip Galvanized Coatings

I. AWS A2.4 - Standard Welding Symbols.

J. AWS D1.1 - Structural Welding Code - Steel.

1.3 QUALIFICATIONS

A. Welders' Certificates: Submit under provisions of Section 01 33 00, certifying welders employed on the Work, verifying AWS qualification within the previous 12 months.

1.4 FIELD MEASUREMENTS

A. Verify that field measurements are as indicated on Drawings.

2. PART 2 PRODUCTS

2.1 MATERIALS

A. Steel Sections: ASTM A36.

B. Steel Tubing: ASTM A500, Grade B.

C. Plates: ASTM A36.

D. Pipe: ASTM A53, Grade B, Schedule 40.

E. Bolts, Nuts, and Washers: ASTM A307 galvanized to ASTM A153 for galvanized components.

F. Welding Materials: AWS D1.1; type required for materials being welded.

G. Shop and Touch Up Primer: SSPC 15, Type 1, red oxide.

H. Touch-Up Primer for Galvanized Surfaces: SSPC 20.

2.2 FABRICATION, GENERAL

A. Fit and shop assemble in largest practical sections, for delivery to site.

B. Fabricate items with joints tightly fitted and secured.

C. Continuously seal joined members by continuous welds unless indicated otherwise.

D. Grind exposed joints flush and smooth with adjacent finish surface. Make exposed joints butt tight, flush, and hairline. Ease exposed edges to small uniform radius.

E. Exposed Mechanical Fastenings: Flush countersunk screws or bolts; unobtrusively located; consistent with design of component, except where specifically noted otherwise.

F. Supply components required for anchorage of fabrications. Fabricate anchors and related components of same material and finish as fabrication, except where specifically noted otherwise.

2.3 FINISHES

A. Clean surfaces of rust, scale, grease, and foreign matter prior to finishing.

B. Do not prime surfaces in direct contact with concrete or where field welding is required.

C. Prime paint items with one coat.

D. Galvanize assembled items to minimum 1.25 oz/sq ft zinc coating in accordance with ASTM A123.

E. Repair damaged galvanized surfaces in accordance with ASTM A780 Method A2.

F. Finish: Site paint exposed to view prime painted items under provisions of Section 09 90 00.

3. PART 3 EXECUTION

3.1 EXAMINATION

A. Verify that field conditions are acceptable and are ready to receive work.

B. Beginning of installation means erector accepts existing conditions.

3.2 PREPARATION

A. Clean and strip primed steel items to bare metal where site welding is required.

B. Supply items required to be cast into concrete or embedded in masonry with setting templates, to appropriate sections.

3.3 INSTALLATION

A. Install items plumb and level, accurately fitted, free from distortion or defects.

B. Allow for erection loads, and for sufficient temporary bracing to maintain true alignment until completion of erection and installation of permanent attachments.

C. Field weld components indicated on Drawings.

D. Perform field welding in accordance with AWS D1.1.

E. After erection, prime welds, abrasions, and surfaces not shop primed, except surfaces to be in contact with concrete.

3.4 SCHEDULE

A. The Schedule is a list of principal items only. Refer to Drawing details for items not specifically scheduled.

B. Miscellaneous Framing and Supports: Steel not a part of structural steel framework as required to complete work; prime paint finish.

C. Bollards: Steel pipe, concrete filled, crowned cap, as detailed; prime paint finish.

D. Opening Frames for Overhead Doors and Wall Openings: Structural sections; prime paint finish.

E. Elevator Hoist Way Beams: Structural sections as detailed, prime paint finish.

F. Elevator Door Sill Supports: Steel shapes as detailed, prime paint finish.

END OF SECTION

SECTION 05 51 00 METAL STAIRS

1. PART 1 GENERAL

1.1 SECTION INCLUDES

A. Steel stair frame of structural sections, with closed risers.

B. Pan to receive concrete fill, stair treads and landings.

1.2 REFERENCES

A. 2010 Americans with Disabilities Act (ADA) Standards for Accessible Design.

B. ASTM A36 - Structural Steel.

C. ASTM A123 - Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products.

D. ASTM A185 - Welded Steel Wire Fabric for Concrete Reinforcement.

E. ASTM A283 - Carbon Steel Plates, Shapes, and Bars.

F. ASTM A325 - High Strength Bolts for Structural Steel Joints.

G. ASTM A500 - Cold-Formed Welded and Seamless Carbon Steel Structural Tubing in Rounds and Shapes.

H. ASTM A653 - General Requirements for Steel Sheet, Metallic-Coated by Hot Dip Process.

I. ASTM C150 - Portland Cement.

J. AWS A2.4 - Standard Welding Symbols.

K. AWS D1.1 - Structural Welding Code.

L. CBC - California Building Code, (CCR) California Code of Regulations, Title 24, Part 2.

M. NAAMM - Metal Stairs Manual.

N. SSPC - The Society for Protective Coatings.

1.3 DESIGN REQUIREMENTS

A. Fabricate stair assembly to support live load of 100 lbs/sq ft with deflection of stringer or landing framing not to exceed 1/360 of span.

B. Fabricate stair assembly to NAAMM - Metal Stairs Manual, Commercial Class.

C. Conform to CBC - California Building Code, (CCR), California Code of Regulations, Title 24, Part 2, and the 2010 ADA Standards for Accessible Design for accessibility requirements for individuals with disabilities.

1.4 SUBMITTALS

A. Submit under provisions of District's Division 01 Requirements

B. Shop Drawings: Indicate profiles, sizes, connection attachments, rein forcing, anchorage, size and type of fasteners, and accessories.

C. Indicate welded connections using standard AWS A2.4 welding symbols. Indicate net weld lengths.

1.5 QUALIFICATIONS

A. Welders' Certificates: Submit under provisions of District's Division 01 Requirements, certifying welders employed on the Work, verifying AWS qualification within the previous 12 months.

1.6 FIELD MEASUREMENTS

A. Verify that field measurements are as indicated on Drawings.

2. PART 2 PRODUCTS

2.1 MATERIALS

A. Steel Sections: ASTM A36.

B. Steel Tubing: ASTM A500, Grade B.

C. Plates: ASTM A283.

D. Sheet Steel: ASTM A653, SS, Grade 33.

E. Stair Treads: Concrete in metal pan.

F. Concrete for Treads and Landings: Portland cement, ASTM C150, Type I, 2,500 psi 28 day strength, 2 to 3 inch slump.

G. Tread and Landing Concrete Reinforcement: Mesh, ASTM A185, size as detailed, unfinished.

H. Bolts, Nuts, and Washers: ASTM A325.

I. Exposed Mechanical Fastenings: Flush countersunk screws or bolts; consistent with design of stair structure.

J. Welding Materials: AWS D1.1; type required for materials being welded.

K. Shop and Touch-Up Primer: SSPC 15, Type 1, red oxide.

L. Touch-up Primer for Galvanized Surfaces: SSPC 20.

2.2 FABRICATION - GENERAL

A. Fit and shop assemble in largest practical sections, for delivery to site.

B. Fabricate components with joints tightly fitted and secured.

C. Continuously seal jointed pieces by continuous welds.

D. Grind exposed joints flush and smooth with adjacent finish surface. Make exposed joints butt tight, flush, and hairline. Ease exposed edges to small uniform radius.

E. Exposed Mechanical Fastenings: Flush countersunk screws or bolts; unobtrusively located; consistent with design of component, except where specifically noted otherwise.

F. Supply components required for anchorage of fabrications. Fabricate anchors and related components of same material and finish as fabrication, except where specifically noted otherwise.

G. Accurately form components required for anchorage of stairs and landings to each other and to building structure.

2.3 FABRICATION - PAN STAIRS AND LANDINGS

A. Fabricate stairs and landings with closed risers and treads of metal pan construction, ready to receive concrete.

B. Form treads and risers with gage sheet steel stock required to support design loadings.

C. Secure reinforced tread pans to stringers with clip angles welded in place.

D. Form stringers with rolled steel channels or rectangular hollow sections.

E. Form landings with minimum sheet stock. Reinforce underside with angles or metal T's to attain design load requirements.

2.4 FINISHES

A. Clean surfaces of rust, scale, grease, and foreign matter prior to finishing.

B. Galvanize assembled items to minimum 1.25 oz/sq ft zinc coating in accordance with ASTM A123 for all exterior installations.

C. Prime paint items with one coat.

D. Do not prime surfaces in direct contact with concrete or where field welding is required.

E. Metal Finish: Site paint under provisions of Section 09 90 00.

F. Concrete Finish: Smooth trowel finish .

3. PART 3 EXECUTION

3.1 EXAMINATION

A. Verify that field conditions are acceptable and are ready to receive work.

B. Beginning of installation means erector accepts existing conditions.

3.2 PREPARATION

A. Clean and strip primed steel items to bare metal where site welding is required.

B. Supply items required to be cast into concrete and embedded in masonry with setting templates, to appropriate sections.

3.3 INSTALLATION

A. Install items plumb and level, accurately fitted, free from distortion or defects.

B. Provide anchors, plates, angles, hangers, and struts required for connecting stairs to structure.

C. Allow for erection loads, and for sufficient temporary bracing to maintain true alignment until completion of erection and installation of permanent attachments.

D. Field weld components indicated on Drawings. Perform field welding in accordance with AWS D1.1.

E. Field bolt and weld to match shop bolting and welding. Conceal bolts and screws whenever possible. Where not concealed, use flush countersunk fastenings.

F. Mechanically fasten joints butted tight, flush, and hairline. Grind welds smooth and flush.

G. Obtain Architect approval prior to site cutting or making adjustments not scheduled.

H. After erection, prime welds, abrasions, and surfaces not shop primed, except surfaces to be in contact with concrete.

END OF SECTION

SECTION 05 51 33 METAL LADDERS

1. PART 1 GENERAL

1.1 WORK INCLUDED

A. Prefabricated aluminum roof access ladders.

1.2 REFERENCES

A. AWS D1.2 - Structural Welding Code - Aluminum.

B. OSHA - Standards of Occupational Safety and Health Administration.

C. ANSI - ANSI A-14.3 Standards.

D. ASTM B221 - Aluminum and Aluminum-Alloy Extruded Bars, Rods, Wire, Shapes and Tubes.

1.3 FIELD MEASUREMENTS

A. Verify actual dimensions on site prior to fabrication.

B. Contractor shall be responsible for a complete installation of all components required.

2. PART 2 PRODUCTS

2.1 MANUFACTURERS:

A. O'Keeffe's Inc., www.okeeffes.com.

B. Alaco Aluminum Ladders, www.alacoladder.com.

C. Dur-Red Products, www.dur-red.com.

D. Lapeyre Stair, Inc., www.lapeyrestair.com.

E. Precision Ladders, LLC, www.precisionladders.com.

F. Substitution: Under provisions of Section 01 25 13.

2.2 MATERIALS

A. Rungs shall be round or square and a minimum of 1-1/8 inch in section, formed from aluminum extrusion, ASTM B221 alloy 6061-T6, and shall be deeply serrated on all sides to provide maximum foot grip and traction. Rungs shall be able to withstand a 250 pound loading without failure. Space rungs 12 inches o.c. as indicated.

B. Channel side rail shall be minimum 3 inch x 1 inch x 1/8 inch aluminum extrusions, ASTM B221 alloy 6061-T6.

C. Welding Materials: AWS D1.2.

D. Finish:

1. Clear natural anodized finish for all interior ladders.

2. Factory finish all exterior ladders with manufacturer's standard powder coating in color as selected by Architect.

2.3 ACCESSORIES

A. Anchorage devices and bolts necessary for installation as required by manufacturer's recommendations.

2.4 FABRICATION

A. Materials used shall be new stock, straight within industry tolerances and free of any defects in finish or structure.

B. Cutting of stock shall be by mechanical means to assure a smooth square and true working edge.

C. Mechanical Connections: Bolted connections shall be made with cast aluminum connectors and stainless steel anchorage devices.

D. Welded Connections: In accordance with AWS D1.2 requirements.

E. Protection of aluminum from dissimilar materials:

1. Dissimilar metals except stainless steel, white bronze, and solid zinc, shall be painted with a heavy brush coat of zinc-chromate primer and one coat of aluminum paint.

2. Aluminum surfaces in contact with mortar, concrete, plaster or other masonry materials shall be given one heavy brush coat of bituminous paint.

3. PART 3 EXECUTION

3.1 PREPARATION

A. Verify proper timing for ladder installation to prevent undue delay in job progress.

B. Installation of ladder units shall be considered as acceptance by the Contractor of the adjacent construction as substantially conforming to the intended details and capability of supporting the ladder unit.

3.2 INSTALLATION:

A. Secure ladders in position as indicated on the Drawings and as required by manufacturer's specifications.

END OF SECTION 05 51 33

SECTION 05 52 00 METAL RAILINGS

1. PART 1 GENERAL

1.1 SECTION INCLUDES

A. Steel tube handrails, balusters, and fittings.

1.2 REFERENCES

A. 2016 Americans with Disabilities Act (ADA) Standards for Accessible Design.

B. ASTM A36 - Specifications for Structural Steel.

C. ASTM A123 - Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products.

D. ASTM A500 - Cold-Formed Welded and Seamless Carbon Steel Structural Tubing in Round and Shapes.

E. ASTM E985 - Permanent Metal Railing Systems and Rails for Buildings.

F. AWS D1.1 - Structural Welding Code - Steel.

G. NAAMM - Metal Finishes Manual.

H. CBC - California Building Code, (CCR) California Code of Regulations, Title 24, Part 2, California State Accessibility Standards.

I. SSPC - The Society for Protective Coatings.

1.3 DESIGN REQUIREMENTS

A. Design, engineer, fabricate and install railing assembly, wall rails, and attachments to resist force of 200 lbs applied in any direction at any point on the rail without damage or permanent set.

B. Conform to CBC, California Building Code, (CCR) California Code of Regulations, Title 24, Part 2 and the 2016 ADA Standards for Accessible Design for accessibility requirements.

C. Fabricate railing assembly, wall rails, and attachments to ASTM E985 requirements.

1.4 SUBMITTALS

A. Submit under provisions of Section 01 33 00.

B. Shop Drawings: Indicate profiles, sizes, connection attachments, anchorage, size and type of fasteners, and accessories.

1.5 REGULATORY REQUIREMENTS

A. Railings and Handrails: CBC Section 11B-505

1.6 FIELD MEASUREMENTS

A. Verify that field measurements are as indicated on Drawings.

2. PART 2 PRODUCTS

2.1 MANUFACTURERS

A. Craneveyor Corp., www.craneveyor.com.

B. R and B Wagner, Inc., www.rbwagner.com.

2.2 STEEL RAILING SYSTEM

A. Rails and Posts: ASTM A500, Grade B, 1-1/2 inch diameter steel tubing, 3/16 inch wall thickness, welded joints.

B. Structural Plates, Shapes, and Bars: ASTM A36.

C. Fittings: Elbows, T-shapes, flanges, escutcheons; machined steel.

D. Wall Brackets: Julius Blum No. 1378, www.juliusblum.com.

E. Splice Connectors: Steel welding collars.

F. Welding Materials: AWS D1.1.

2.3 FABRICATION

A. Fit and shop assemble components in largest practical sizes, for delivery to site.

B. Fabricate components with joints tightly fitted and secured.

C. Exposed Mechanical Fastenings: Flush countersunk screws or bolts; unobtrusively located; consistent with design of component, except where specifically noted otherwise.

D. Supply components required for anchorage of fabrications. Fabricate anchors and related components of same material and finish as fabrication, except where specifically noted otherwise.

E. Continuously seal joined pieces by continuous welds in accordance with AWS requirements.

F. Grind exposed joints flush and smooth with adjacent finish surface. Make exposed joints butt tight, flush, and hairline. Ease exposed edges to small uniform radius.

G. Accurately form components to suit stairs and landings, to each other and to building structure.

2.4 FINISHES

A. Shop and Touch-up Primer: SSPC, Type 1, red oxide.

B. Touch-Up Primer for Galvanized Surfaces: SSPC 20.

C. Finish: Site paint under provisions of Section 09 90 00.

3. PART 3 EXECUTION

3.1 EXAMINATION

A. Verify that field conditions are acceptable and are ready to receive work.

B. Beginning of installation means erector accepts existing conditions.

3.2 PREPARATION

A. Clean and strip primed steel items to bare metal where site welding is required.

B. Supply items required to be cast into concrete and embedded in masonry with setting templates, to appropriate Sections.

3.3 INSTALLATION

A. Install components plumb and level, accurately fitted, free from distortion or defects.

B. Provide anchors required for connecting railings to structure. Anchor railing to structure.

C. Field weld anchors as indicated on Drawings. Grind welds smooth. Touch-up welds with primer.

D. Conceal bolts and screws whenever possible. Where not concealed, use flush countersunk fastenings.

E. Install wall mounted handrail brackets to bottom of handrail.

F. Install wall mounted handrails with a 1-1/2 inch space between wall and inside face of handrail.

G. Extend handrail at top of stairs a minimum of 1’-0” past face of riser. Extend handrail at bottom of stairs a minimum distance of 1’-0” plus depth of one stair tread. The 1'-0” handrail extensions to be level and parallel with the landing surface.

H. Extend handrails at top and bottom of ramps a minimum of 1’-0”. The 1'-0” handrail extensions to be level and parallel with the landing surface.

END OF SECTION 05 52 00

SECTION 06 10 00 ROUGH CARPENTRY

1. PART 1 GENERAL

1.1 SECTION INCLUDES

A. Structural floor, wall, and roof framing.

B. Built-up structural.

C. Wall and roof sheathing.

D. Wood furring, backing and grounds.

E. Preservative treatment of wood.

1.2 REFERENCES

A. CBC - California Building Code, (CCR) California Code of Regulations Title 24, Part 2.

B. ALSC - American Lumber Standards Committee: Softwood Lumber Standards.

C. ANSI/AF & PA NDS-12 - National Design Specifications for Wood Construction.

D. ANSI/SDPWS - Special Design Provisions for Wind and Seismic.

E. ASTM D6109 – Standard Test Methods for Flexural Properties of Unreinforced and Reinforced Plastic Lumber.

F. ASTM E84 - Standard Test Method for Surface burning Characteristics of Building Materials.

G. AWPA - American Wood Preservers' Association: Book of Standards.

H. MS MIL-L-19140 - Fire Retardant Wood Preservative Chemicals.

I. National Bureau of Standards - Product Standard PS-1-09 for Construction and Industrial Plywood.

J. WCLIB - West Coast Lumber Inspection Bureau: Standard Grading Rules for West Coast Lumber.

K. WWPA - Western Wood Products Association.

1.3 QUALITY ASSURANCE

A. Lumber Grading Agency: Certified by ALSC.

B. Plywood Grading Agency: Certified by APA.

1.4 REGULATORY REQUIREMENTS

A. Conform to CBC, California Building Code, (CCR) California Code of Regulations, Title 24, Part 2, Chapter 23.

B. Allowable stress design values shall be in compliance with the CBC, California Building Code, (CCR) California Code of Regulations, Title 24, Part 2, Section 2306, ANSI/AF & PA NDS-12 - National Design Specifications for Wood Construction, and ANSI/SDPWS - Special Design Provisions for Wind and Seismic.

1.5 SUBMITTALS

A. Submit product data under provisions of City's Division 01 General Requirements.

B. Provide technical data on wood preservative materials and application instructions.

C. In lieu of grade stamping exposed-to-view lumber and plywood, submit manufacturer's certificate under provisions of City's Division 01 General Requirements that products meet or exceed specified requirements.

1.6 DELIVERY, STORAGE, AND HANDLING

A. Store and protect products under provisions of City's Division 01 General Requirements.

B. Deliver materials free from pest infestation. Protect materials on site to prevent termite, beetle or other wood boring insect attacks.

C. Stack lumber flat, off grade, with spacers between each bundle to promote air circulation. Provide for air circulation around and under coverings.

2. PART 2 PRODUCTS

2.1 LUMBER MATERIALS

A. Lumber Grading Rules: WCLIB and WWPA. Lumber shall bear WCLIB grade stamp.

B. 4x and 6x Framing: Douglas Fir species, Dense No. 1 grade.

C. 2x Joist Framing: Douglas Fir species, No. 2 grade.

D. 2x Rafter Framing: Douglas Fir species, No. 2 grade.

E. 2x and 3x Structural Framing, Studs, Plate and Blocking: Douglas Fir Species, No. 2 grade.

F. Non-structural Light Framing Studs, Plate and Blocking: Douglas Fir species, construction grade.

2.2 MOISTURE CONTENT

A. 2x and 3x material, 19 percent moisture content, S-Dry. Structural and non structural framing, beam, rafters, joists, studs, plates and blocking.

B. 4x and 6x material, 19 percent moisture content at time of application of Architectural finishes. 22 percent maximum moisture content at time of delivery to project site. Materials to be air dried as required to achieve 22 percent moisture content prior to delivery to site. Structural and non structural framing, beam, rafters, joists, studs, plates and blocking.

C. Lumber materials with a moisture content above 19 percent and less than 22 percent at the time of installation shall be tested for moisture content prior to covering with Architectural finishes. Moisture tests shall be performed under the provisions of Section 01 45 29.

D. No lumber shall be covered with an Architectural finish until the moisture content of the lumber is 19 percent or below.

2.3 PLYWOOD MATERIALS

A. Roof Sheathing: APA Structural I, Grade C-D, Exposure 1 minimum 5-ply construction, meeting product Standard PS-1-09.

B. Wall Sheathing: APA Structural I, Grade C-D, Exposure 1 minimum 5-ply construction, meeting product standard PS-1-09.

C. Telephone and Electrical Panel Boards: APA Grade C-D with exterior glue, minimum 5 ply, 3/4 inch thick, meeting PS-1-09.

2.4 ORIENTED STRAND BOARD (OSB)

A. Roof Sheathing: APA rated sheathing, Exposure 1, Structural 1, meeting PS-2 and PRP-108. Nominal thickness not less than 19/32 inch. Span rating of 32/16.

B. Wall Sheathing: APA rated sheathing, Exposure 1, Structural 1, meeting PS-2 and PRP-108. Nominal thickness not less than 15/32 inch. Span rating of 32/16.

2.5 ACCESSORIES

A. Fasteners: Hot-dipped galvanized steel for exterior, high humidity, and treated wood locations; plain finish elsewhere; size and type to suit condition.

B. Connectors: As indicated.

C. Joist Hangers: Galvanized steel, sized to suit joists and framing conditions; manufactured by Simpson, USP Connectors or KC Metals.

D. Anchors: Thru bolt or anchor bolt to concrete or masonry unless otherwise noted. Bolt for anchorage to steel unless otherwise noted.

E. Building Paper: No. 15 asphalt felt. Plain untreated cellulosic building paper.

2.6 WOOD TREATMENT

A. Preservative Treatment: Where lumber or plywood is indicated as treated or is specified herein to be treated, comply with applicable requirements of AWPA Standards C2 (Lumber) and C9 (Plywood).

B. Pressure treat all lumber in contact with ground. After treatment kiln-dry lumber to a maximum moisture content of 19 percent.

C. Pressure treat above ground items as indicated. After treatment, kiln-dry lumber and plywood to a maximum moisture content, respectively, of 19 percent and 15 percent. Treat indicated items and the following:

1. Wood cants, nailers, curbs, equipment support bases, blocking, stripping and similar members in connection with roofing, flashing, vapor barriers and waterproofing.

2. Horizontal wood sills, sleepers, blocking, furring, stripping and similar concealed members in contact with masonry or concrete.

3. Horizontal wood framing members less than 18 inches above grade.

4. Wood floor plates installed over concrete slabs directly in contact with earth.

5. Ends of wood girders entering masonry or concrete walls.

6. Framing members used in exterior door, window, or louver openings.

D. Complete fabrication of treated items prior to treatment, where possible. If cut or drilled after treatment, coat cut or drilled surfaces with heavy brush coat of same chemical used for treatment and to comply with AWPA M4. Inspect each piece of lumber or plywood after drying and discard damaged or defective pieces.

3. PART 3 EXECUTION

3.1 FRAMING

A. Erect wood framing members level and plumb.

B. Place horizontal members laid flat, crown side-up.

C. Construct framing members full length without splices.

D. Double members at openings over 1 sq ft. Space short studs over and under opening to stud spacing.

E. Construct double joist headers at floor and ceiling openings. Frame rigidly into joists.

F. Construct double joists under wall studding.

G. Bridge joists in excess of 8 feet span at mid-span members. Fit solid blocking at ends of members.

H. Coordinate installation of glue laminated structural units and shop fabricated wood trusses.

3.2 FURRING, BLOCKING AND GROUNDS

A. Provide wherever shown and where required for attachment of other work. Coordinate with work of other sections.

B. Item locations include but are not limited to toilet accessories, toilet partitions, door frames, window frames, hardware, access doors and ladders, cabinetry, miscellaneous equipment locations and mechanical, plumbing and electrical item locations and all other locations of wall mounted items.

C. Install plywood backboards for telephone, data and other electrical equipment.

D. Form to shapes as shown and cut as required for true line and level of work to be attached. Coordinate location with other work involved.

E. Attach to substrates as required to support applied loading. Countersink bolts and nuts flush with surfaces, unless otherwise indicated.

F. Build into masonry during installation of masonry work. Where possible, anchor to formwork before concrete placement.

G. Install plumb and level with closure strips at edges and openings. Shim with wood as required for tolerance of finished work.

H. Firestop all concealed spaces of wood stud walls, ceilings and floor levels at 10 foot intervals both vertically and horizontally.

I. Firestop all concealed vertical and horizontal spaces as occur at soffits, vents, stair stringers, pipes and similar openings in compliance with CBC, (CCR) Title 24, Part 2, Section 718.

J. Firestopping shall consist of closely fitted wood blocks of 2 inch nominal thickness lumber of same width as framing members.

3.3 SHEATHING

A. Secure roof sheathing perpendicular to framing members with ends staggered. Secure sheet edges over firm bearing. Provide solid edge blocking between sheets. Space panels 1/8 inch apart at ends and edges.

B. Secure wall sheathing perpendicular to wall studs, with ends staggered, over firm bearing.

3.4 FIELD QUALITY CONTROL

A. Field inspection and testing will be performed under provisions of City's Division 01 General Requirements.

B. Lumber materials will be inspected for compliance with material grading rules, limitations for moisture content and pest infestation prior to any materials being concealed from view or being covered with an architectural finish.

3.5 TOLERANCES

A. Framing Members: 1/4 inch maximum from true position.

B. Surface Flatness of Floor: 1/4 inch in 10 feet maximum.

END OF SECTION 06 10 00

SECTION 06 40 00 ARCHITECTURAL WOODWORK

PART 1 GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section includes requirements including but not limited to:
1. Plastic laminate cabinets.
2. Plastic laminate and solid surface countertops.
3. Plastic laminate panels.
4. Standing and running trim.
5. Closet and utility shelving.
6. Shop finishing.
7. Accessories necessary for a complete installation.

B. Related Sections:
1. Section 06 10 00: Rough Carpentry.
2. Section 06 20 00: Finish Carpentry and Millwork.
3. Section 09 90 00: Painting and Coating.

1.3 DEFINITIONS

A. Architectural woodwork includes wood furring, blocking, shims, and hanging strips for installing woodwork items unless concealed within other construction before woodwork installation.

B. Woodwork Institute (WI). The North American Architectural Woodwork Standards (NAAWS) have been adopted and published jointly by the Woodwork Institute and the Architectural Woodwork Manufacturers Association of Canada as the successor, replacement and latest edition of the Architectural Woodwork Standards, Edition 2.

C. BHMA: Builders Hardware manufacturers Association, a trade organization which represents almost all of the North American Manufacturers of builder's hardware and its number shown here-in reflects minimum standards. All manufacturers listed use the reference numbers for product functions and use.

1.4 SUBMITTALS

A. Product Data:
1. Technical data for each type of product indicated including cabinet hardware and accessories:
   a. Include data for fire retardant treatment from chemical treatment manufacturer and certification by treating plant that treated materials comply with requirements.

B. Shop Drawings:
1. Show location of each item, dimensioned plans and elevations, large-scale details, attachment devices, and other components:
   a. Show details full size.
   b. Show locations and sizes of furring, blocking, and hanging strips including concealed blocking and reinforcement specified in other Sections.

c. Show locations and sizes of cutouts and holes for plumbing fixtures, faucets, and other items installed in architectural woodwork.
d. Provide a Woodwork Institute Certified Compliance Label on the first page of the shop drawings.

C. Samples:
1. Lumber with or for transparent finish, not less than five inches (125 mm) wide by 24 inches (600 mm) long, for each species and cut, finished on one (1) side and one (1) edge.
2. Veneer faced panel products with or for transparent finish, eight inches by ten inches (200 by 250 mm), for each species and cut. Include at least one (1) face veneer seam and finish as specified.
3. Lumber and panel products with shop applied finish, 50 square inches (300 sq. cm) for lumber and eight inches by ten inches (200 mm by 250 mm) for panels, for each finish system and color, with 1/2 of exposed surface finished.
4. Plastic laminates, eight inches by ten inches (200 mm by 250 mm), for each type, color, pattern, and surface finish and specified edge material applied to one (1) edge.
5. Quartz surfacing materials, six inches (6”) square.
6. Corner pieces:
a. Cabinet front frame joints between stiles and rails, as well as exposed end pieces, 18 inches (450 mm) high by 18 inches (450 mm) wide by six inches (150 mm) deep.
7. Exposed cabinet hardware and accessories, one (1) unit for each type and finish.

D. Qualification Data: For fabricator/installer.

E. Woodwork Quality Standard Compliance Certificates: Woodwork Institute (WI) Quality Certification Program certificates (CCP).

1.5 QUALITY ASSURANCE

A. Regulatory Requirements:
1. Building code: Comply with applicable requirements of CBC Chapter 8 for Interior Finishes.
2. Accessibility:
a. 2022 California Building Code; Section 11B-309 for Casework, Section 11B-404 Doors and Hardware and Section 11B-703 for Signage (where applicable).
b. ADA Accessibility Guidelines (ADAAG) for Buildings and Facilities; final guidelines and revisions.
3. Quality standard: Unless otherwise indicated, comply with WI for premium grade architectural woodwork indicated for construction, finishes, installation, and requirements. Provide certified compliance labels and certificates indicating that woodwork, including installation, complies with requirements of grades specified.
4. Fire test response characteristics: Where fire retardant materials or products are indicated, provide materials and products with specified fire test response characteristics determined by testing identical products per test method indicated by UL. Identify with appropriate markings of applicable testing and inspecting agency in the form of separable paper label or, where required by authorities having jurisdiction, imprint on surfaces of materials that will be concealed from view after installation.

B. Fabricator Qualifications: Shop having minimum five (5) years’ documented experience who employs skilled workers who custom fabricate products similar to those required and who is a participating member of WI.

C. Source Limitations: Engage a qualified woodworking firm to assume undivided responsibility for production of interior architectural woodwork with sequence matched wood veneers and

transparent finished wood doors that are required to be of same species as woodwork.

D. Quality Standard: Unless otherwise indicated, comply with North American Architectural Woodwork Standards, meeting or exceeding ANSI A161.1, for grades of architectural woodwork indicated for construction, finishes, installation, and requirements.

1.6 DELIVERY, STORAGE, AND HANDLING

A. Do not deliver woodwork until painting and similar operations that could damage woodwork is completed in installation areas. If woodwork must be stored in other than installation areas, store only in areas where environmental conditions comply with requirements specified in "Project Conditions" Article.

PART 2 PRODUCTS

2.1 MATERIALS

A. Provide materials that comply with requirements of WI quality standard for each type of woodwork and quality grade specified, unless otherwise indicated.

B. Wood Products:
1. Hardboard: AHA A135.4.
2. Medium density fiberboard:
   a. ANSI A208.2, Grade MD, made with binder containing no urea formaldehyde; minimum 48 pcf density except that minimum for screw holding capacity on face shall be 300 pounds; minimum 3/4 inches (19 mm) thick, edged and faced as specified:
      1) Arauco; Trupan MDF, VESTA Technology.
      2) Roseburg Forest Products, Inc.; Roseburg MDF products.
      3) Approved equal.
3. Particleboard: Unless otherwise noted by District, particleboard is not to be used.
4. Softwood plywood: DOC PS 1, medium density overlay.

C. Lumber:
1. Comply with applicable provisions for grading and workmanship of WI Quality Standards, and requirements specified. Provide lumber surfaced 4 sides (S4S) and fabricated to profiles shown. Kiln dry lumber to 19 percent moisture content:
   a. Furring, blocking, and shims: No. 1 Common; Southern Pine.
   b. Solid hardwood for opaque finish: Plain sawn Yellow Poplar, free from checks, splits, and sound knots.

D. Drawer Locks
1. Compx National Security Products

E. Thermoset Decorative Panels:
1. Particleboard or medium density fiberboard finished with thermally fused, melamine impregnated decorative paper complying with LMA SAT-1:
   a. Provide PVC or polyester edge banding complying with LMA EDG-1 on components with exposed or semi-exposed edges.

F. High Pressure Decorative Laminate - NEMA LD 3, grade indicated or as required by woodwork quality standard:
1. Manufacturer is subject to compliance with requirements; provide high pressure decorative laminates by one of the following:
   a. Arborite – Basis of Design

b. Formica Corporation.
c. Wilsonart LLC.

2.2 FIRE RETARDANT TREATED MATERIALS

A. Where fire retardant treated materials are indicated, use materials complying with requirements acceptable to authorities having jurisdiction, and with fire test response characteristics specified:
1. Do not use treated materials that do not comply with requirements of referenced woodworking standard or that are warped, discolored, or defective.
2. Use fire retardant treatment formulations that do not bleed through or otherwise adversely affect finishes. Do not use colorants to distinguish treated materials from untreated materials.
3. Identify fire retardant treated materials with appropriate classification marking of UL, U.S. Testing, Timber Products Inspection, or another testing and inspecting agency acceptable to authorities having jurisdiction.

B. Fire Retardant Particleboard:
1. Panels complying with requirements, made from softwood particles and fire retardant chemicals mixed together at time of panel manufacture to achieve flame spread index of 25 or less and smoke developed index of 50 or less per ASTM E84:
a. For panels 3/4 inch (19 mm) thick and less, comply with ANSI A208.1 for Grade M-2 except for the following minimum properties: Modulus of rupture, 1,600 psi 11 MPa; modulus of elasticity, 300,000 psi 2,070 MPa; internal bond, 80 psi 550 kPa; and screw-holding capacity on face and edge, 250 and 225 lbf 1,100 and 1,000 N, respectively.
b. For panels 13/16 inch to 1-1/4 inches (20 to 32 mm) thick, comply with ANSI A208.1 for Grade M-1 except for the following minimum properties: Modulus of rupture, 1,300 psi 9 MPa; modulus of elasticity, 250,000 psi 1,720 MPa; linear expansion, 0.50 percent; and screw-holding capacity on face and edge, 250 and 175 lbf 1,100 and 780 N, respectively.
c. Product: Subject to compliance with requirements, provide Duraflake FR by Arauco.

C. Fire Retardant Fiberboard: Medium density fiberboard panels complying with ANSI A208.2, made from softwood fibers, synthetic resins, and fire retardant chemicals mixed together at time of panel manufacture to achieve flame spread index of 25 or less and smoke developed index of 200 or less in accordance with ASTM E84.

2.3 CABINET HARDWARE AND ACCESSORIES

A. Hardware Standard: Comply with BHMA A156.9 for items indicated by referencing BHMA numbers of items referenced to this standard. Provide cabinet hardware and accessory materials associated with architectural cabinets.

B. Frameless Concealed Hinges (European Type) - BHMA A156.9, B01602, Self-Closing:
1. Provide 170-degree minimum opening capabilities. For end doors perpendicular to walls, provide 90-degree type.
2. For doors 32 inches high or less, provide two (2) pairs of hinges, add 1/2 pair for every additional 20 inches.
3. Products are subject to compliance with requirements; provide from one of the following:
a. Hafele North America Co.
b. Julius Blum, Inc.
c. Mepla-Alfit, Inc.

C. Drawer and Door Pulls: Epco BP128-SS Bar Pull (https://www.epcohardware.com/Bar-Pulls-Stainless-Steel/Bar-Pull-Stainless-Steel-BP-SS/)

D. Catches - Magnetic, Complying with BHMA A156.9 and B03161:
   1. Rockwood 901 by Assa Abloy.
   2. Comparable product.

E. Cabinet Shelf Rests - Nickel plated, 7 mm diameter shelf support pegs in brass sockets, complying with BHMA A156.9, B04013:
   1. Hafele 282.01.701 x 282.50.704 or comparable product.

F. Closet Rods and Flanges: 1-1/2-inch diameter, satin finished chrome plated steel or satin finished stainless steel with matching end flanges.

G. Adjustable Shelf Standards and Brackets for Wall Hung Open Shelving - BHMA A156.9, B04071; With Shelf Rests, B04081:
   1. Standards: Model No. 87ANO Super Duty 87/186/187 Steel Series; lengths as indicated, by Knape & Vogt or comparable product.
   2. Brackets: Model No. 187 LL ANO 12 to 24 for 12-inch to 24-inch (300 mm to 600 mm) deep shelves by Knape & Vogt or comparable product.
   3. Shelf rests: Model No. 210 ANO End Rest and Model No. 211 ANO Center Rest with Model No. 129 RUB Rubber Cushions or comparable product.

H. Shelf Rests: BHMA A156.9, B04013; metal, two pin type with shelf hold down clip.

I. Silencers:
   1. Provide rubber silencers on jamb and/or head and sill strike areas of all cabinet doors and drawers, two (2) for paired doors, and three (3) for single doors:
      a. Size: Approximately 1/4-inch (6.4 mm) diameter.
      b. Color: Compatible with adjacent finish.

J. Drawer Slides - BHMA A156.9, B05091:
   1. Provide positive stop, self-closing side mounted, full extension, zinc plated steel drawer slides with steel ball bearings:
      a. Pencil drawer slides: Grade 1; for drawers not more than three inches (75 mm) high and 24 inches (600 mm) wide; Accuride 2006 having 3/4 extension carburized steel ball bearing, side mounting, 45-pound capacity medium duty load rating, cold rolled steel slide members and ball retainers, bright electro zinc plate finish.
      b. Box drawers (less than eight inches [8”] deep): Grade 1HD-100; for drawers not more than six inches (150 mm) high and 24 inches (600 mm) wide. Provide Accuride 4034; up to 24 inches wide, full extension carburized steel ball bearing, side mounting, 150-pound capacity medium duty load rating, cold rolled steel slide members and ball retainers, cushioned in and out stops, detent-in, progressive action, positive stop, clear zinc finish.
      c. Pedestal drawers (greater than eight inches [8”] deep): Accuride 4032; up to 24 inches wide, full extension carburized steel ball bearing, rail mounting, minimum 150-pound capacity heavy duty load rating, cold rolled steel slide members and ball retainers, cushioned in and out stops, detent-in, progressive action, positive stop, bright electro zinc plate finish.
      d. Lateral file drawer slides: For drawers more than six inches (150 mm) high or 24 inches (600 mm) wide; heavy-duty, up to 42 inches wide, 3640A by Accuride.
      e. Keyboard slide: Model No. 2109, color black, by Accuride, Inc.
      f. Refuse cabinets: Accuride C3600-201D, full extension carburized steel ball bearing, bracket mounting, heavy-duty, cold rolled steel slide members and ball retainers, cushioned in and out stops, progressive action, positive stop, clear zinc plate finish.

K. Door and Drawer Locks:
   1. Provide locks for each cabinet door and drawer as indicated on Drawings. Finish exposed portions of locks to match cabinet pull finish. Furnish two (2) keys with each lock and key locks inside one room alike and provide master key for locks in Project. Selections to meet BHMA A156.11 and E07041 (for drawers) or E07121 (for doors):
      a. Cam lock similar to Hafele 235.20.20x, chrome plated, with offset cam 219.13.9xx, sized to fit opening.
      b. Cam lock similar to Hafele 235.20.20x, chrome plated, with surface mounted strike 251.60.703.
      c. Pairs of doors:
         1) Inactive leaf: Furniture bolt similar to Hafele 252.02.644, polished chrome, with strike 251.60.703.
         2) Active leaf: Single door lock assembly.

L. Grommets for Cable Passage through Countertops:
   1. Two-inch (51 mm), black, molded plastic grommets and matching plastic caps with slot for wire passage:
      a. Product: Subject to compliance with requirements, provide TG series by Doug Mockett & Company, Inc.

M. Trash Grommet Through Countertop: TM1B, six-inch by two-inch (6” x 2”) polished stainless-steel grommet by Doug Mockett and Co., Inc.

N. Exposed Hardware Finishes:
   1. For exposed hardware, provide finish that complies with BHMA A156.18 for BHMA finish number indicated:
      a. Satin chromium plated: BHMA 626 for brass or bronze base; BHMA 652 for steel base.

O. Concealed Hardware: Provide finish complying with product class requirements in BHMA A156.9.

2.4 MISCELLANEOUS MATERIALS

A. Furring, Blocking, Shims, and Hanging Strips: Fire retardant treated softwood lumber, kiln dried to less than 15 percent moisture content.

B. Anchors: Select material, type, size, and finish required for each substrate for secure anchorage. Provide nonferrous metal or hot dip galvanized anchors and inserts on inside face of exterior walls and as required for corrosion resistance. Provide toothed steel or lead expansion sleeves for drilled in place anchors.

C. Hanging (Zee Clip) Strips: Extruded aluminum zee type interlocking clips; type, size and quantity for the condition of use.

D. Screws: Select material, type, size, and finish required for each use. Comply with FS FF-S-111 for applicable requirements.

E. Nails: Select material, type, size, and finish required for each use. Comply with FS FF-N-105 for applicable requirements.

F. Blind Splines: Specialty devices, as required for tight butt joining, types and size as recommended by woodwork fabricator.

G. Covercaps: Where mortises of fastener heads or drawdowns are exposed (blind holes) in

finished work, provide black plastic covercaps.

H. Adhesive for Bonding Plastic Laminate:
1. Resorcinol:
a. Adhesive for bonding edges: Hot melt adhesive.

I. Stone Seam Adhesive:
1. Two-part, epoxy resin stone adhesive with an initial set time of not more than two (2) hours at 70 degrees F (21 degrees C), and with a VOC content of 65 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24):
a. Color: Clear.
b. Products: Subject to compliance with requirements, provide Bonstone Materials Corporation - Duproxi or Akemi North America - Akepox.

J. Stone Sealer:
1. Colorless, nonstaining, single component, neutral curing silicone sealant that does not affect color or physical properties of stone surfaces, recommended by stone producer for application indicated. Subject to compliance with requirements, provide products by one of the following:
a. Bostik, Inc.
b. Custom Building Products.
c. Hillyard, Inc.

K. Stone Cleaner: Cleaner specifically formulated for stone types, finishes, and applications indicated, recommended by stone producer and by sealer manufacturer. Do not use cleaning compounds containing acids, caustics, harsh fillers, or abrasives.

2.5 FABRICATION

A. Woodwork Grade:
1. WI Custom Grade woodwork complying with referenced quality standard:
a. Complete fabrication, including assembly, finishing, and hardware application, before shipment to site to the maximum extent possible. Disassemble components as necessary for shipment and installation. Where necessary for fitting at site, provide allowance for scribing, trimming, and fitting. The width of filler panels shall not exceed 2 inches or 2 inches clear dimension from adjacent wall to outside face of cabinet door in a 90-degree position, whichever is greater.
b. Trial fit assemblies at fabrication shop that cannot be shipped completely assembled. Install dowels, screws, bolted connectors, and other fastening devices that can be removed after trial fitting. Verify various parts fit as intended and check measurements of assemblies against field measurements indicated on shop drawings before disassembling for shipment.

B. Wood Moisture Content: Comply with requirements of referenced quality standard for wood moisture content in relation to ambient relative humidity during fabrication and in installation areas.

C. Sand fire retardant treated wood lightly to remove raised grain on exposed surfaces before fabrication.

D. Fabricate woodwork to dimensions, profiles, and details indicated. Ease edges to radius indicated for the following:
1. Corners of cabinets and edges of solid wood (lumber) members 3/4 inch (19 mm) thick or less: 1/16 inch (1.5 mm).
2. Corners of cabinets and edges of solid wood (lumber) members 3/4 inch (19 mm) thick

or less: 1-1/2 inch (38 mm).
3. Corners of cabinets and edges of solid wood (lumber) members and rails: 1/16 inch (1.5 mm).

E. Shop cut openings to maximum extent possible to receive hardware, appliances, plumbing fixtures, electrical work, and similar items. Locate openings accurately and use templates or roughing-in diagrams to produce accurately sized and shaped openings. Sand edges of cutouts to remove splinters and burrs:
1. Seal edges of openings in countertops with a coat of varnish.

F. Plastic Laminate Faced Wood Paneling - WS Premium Grade:
1. Plastic laminate - high pressure decorative laminate complying with NEMA LD 3:
   a. Faces: Grade SGF.
   b. Backs: Grade BKH.
   c. Exposed edges: Same as faces.
2. Colors, patterns, and finishes:

PL- 1 Plastic Laminate
Basis of Design: Classic Artisan Walnut
Manufacturer: Arborite

PL- 2 Plastic Laminate
Basis of Design: Noble Artisan Walnut
Manufacturer: Arborite

   a. Wood grains, matte finish: **Artisan Walnut**
      1) Grain direction: Vertical.
3. Panel core - particleboard or medium density fiberboard:
   a. Thickness: 3/4 inch (19 mm).
4. Exposed panel edges:
   a. Applied solid wood banding 11/16 inch (18 mm) thick by depth of panels.
5. Adhesive for bonding edges: Hot melt adhesive or adhesive for faces.
6. Assemble panels by gluing and concealed fastening.

G. Plastic Laminate Cabinets - WS Premium Grade:
1. WI type of cabinet construction: Flush overlay.
2. Materials:
   a. Laminate cladding for exposed surfaces - high pressure decorative laminate:
      1) Horizontal surfaces other than tops: Grade HGS.
      2) Post formed surfaces: Grade HGP.
      3) Vertical surfaces: Grade VGS.
      4) Edges: Grade HGS.
   b. Semi-exposed surfaces:
      1) Surfaces other than drawer bodies - thermoset decorative panels:
         a) Edges of plastic laminate shelves: Grade HGS, matching laminate in color, pattern, and finish.
         b) For semi-exposed backs of panels with exposed plastic laminate surfaces, provide surface of high pressure decorative laminate, Grade VGS.
      2) Drawer sides and backs: Solid hardwood lumber.
      3) Drawer bottoms: Hardwood plywood.
   c. Concealed backs of panels with exposed plastic laminate surfaces: High pressure decorative laminate, Grade BKL.
3. Colors, patterns, and finishes:

PL- 1 Plastic Laminate
Basis of Design: Classic Artisan Walnut
Manufacturer: Arborite

PL- 2 Plastic Laminate
Basis of Design: Noble Artisan Walnut
Manufacturer: Arborite

Provide dust panels of 1/4 inch (6.4 mm) plywood or tempered hardboard above compartments and drawers, unless located directly under tops.

4. Fabrication:
   a. Join case body members using concealed dado or dowel methods utilizing glue and pressure. Reinforce dado method with nailing or screws. Mechanical fasteners are not permitted:
      1) Base cabinet bottoms and subtops: Bottoms, 3/4-inch particleboard with low pressure laminate finish on interior side and phenolic backing sheet on concealed side. Subtops, 3/4-inch particleboard with phenolic backing sheet both sides. Fabricate all base cabinets with subtops.
      2) Wall cabinet tops and bottoms: Tops, one-inch (1”) particleboard with low pressure laminate finish on interior side and phenolic backing sheet on concealed side. Bottoms, one-inch (1”) particleboard with manufacturer's low pressure laminate finish both sides.
      3) Cabinet ends: 3/4-inch particleboard with low pressure laminate finish on interior side and phenolic backing sheet on concealed side. Install high pressure plastic laminate on exposed sides of cabinet ends.
      4) Cabinet backs - 1/4-inch hardboard with low pressure laminate finish for standard unexposed backs:
         a) Fabricate with continuous hot melt glue joint between sides, tops, bottoms, and back on concealed side.
         b) Exposed backs: 3/4-inch particleboard with low pressure laminate finish on interior side and high pressure plastic laminate on exterior, exposed side.
      5) Cabinet shelves (adjustable, semi-concealed): 3/4-inch particleboard with low pressure laminate finish on both sides. Provide one-inch (1”) particleboard for shelves for unsupported spans over 36 inches.
      6) Cabinet doors: 3/4-inch particleboard with high pressure plastic laminate on exterior side and heavy gauge balancing sheet on interior side.
      7) Drawer fronts: 3/4-inch particleboard with high pressure plastic laminate on exterior side and heavy gauge balancing sheet on interior side.
      8) Drawer construction - 1/2-inch solid hardwood back, sides, and subfront; tongued and dadoed into back and subfront, joints glued and pinned; 1/4-inch hardboard bottom tongued and dadoed in all four sides, back, and subfront. Provide additional support with continuous hot melt glue joint on underside of drawers between sides, back, subfront, and bottom:
         a) Reinforce drawer bottoms as required with spreaders.
         b) Apply drawer front to subfront in accordance with manufacturer's standard procedures.
         c) Dividers: 3/4-inch particleboard with manufacturer's low pressure laminate finish on both sides. Secure to inside of cabinet with manufacturer's standard plastic clips.
         d) Dust panels: Provide dust panels of 1/4-inch plywood or tempered hardboard above compartments and drawers except where located directly under tops.
         e) Finish exterior exposed surfaces with high pressure plastic laminate. Laminate plastic to particleboard core with balancing sheet using urea resin formaldehyde glue. Fabricate using cold press method with regulated pressure for minimum eight hours at minimum 70 degrees F.

H. Countertops - WI Premium Grade:
   1. Solid surface:

a. Solid surfacing material thickness: 3/4-inch.
b. No drip bullnose waterfall edge, 3/16-inch maximum deflections with 150 lbs load.
c. Core material for top and splashes minimum 3/4-inch industrial grade particle board.
d. Backsplash: Integral cove splash, 4 inches tall minimum, at locations as indicated on Drawings.
e. End splash: 4 inches butt end splash.
f. Top splash: Square edge.
g. Solid stock maple hardwood edges with W-6 finishes, in accordance with NEMA standard LD-3.
h. Colors, patterns, and finishes:

SS-1 Solid Surface Basis of Design
Manufacturer: Corian
Color: Ash Aggregate
Areas: Training Class (115), Vestibule (125), Kitchen Bar Island (218)

SS-2 Solid Surface Basis of Design
Manufacturer: Corian
Color: Ash Concrete
Locations: 2nd Floor Restrooms

SS-3 Solid Surface Basis of Design
Manufacturer: Corian
Color: Pearl Gray
Locations: Window Trim

Fabrication:

i. Fabricate tops in one piece, unless otherwise indicated. Comply with solid surfacing material manufacturer's written recommendations for adhesives, sealers, fabrication, and finishing:
   1) Fabricate tops with shop applied edges of materials and configuration indicated.
   2) Fabricate tops with loose backsplashes for field application.
j. Drill holes in countertops for plumbing fittings and soap dispensers in shop.

2. Countertop construction tolerances:
   k. Variation from plumb: For vertical lines and surfaces, do not exceed 1/16 inch in 48 inches.
   l. Variation from level: Do not exceed 1/8 inch in 96 inches, 1/4 inch maximum.
   m. Variation in joint width: Do not vary joint thickness more than 1/4 of nominal joint width.
   n. Variation in plane at joints (lipping): Do not exceed 1/64-inch difference between planes of adjacent units.
   o. Variation in line of edge at joints (lipping): Do not exceed 1/64-inch difference between edges of adjacent units, where edge line continues across joint.

I. Countertops and Backsplashes:
1. Countertops: Where indicated on Drawings; provide countertops with rolled edges in as long as practical continuous lengths. Provide field glued splines at joints. No joints closer than 24 inches either side of sink cutout.
2. Backsplash: Integral to countertop, four inches (4”) high unless otherwise shown. Fabricate with single continuous sheet of laminate from front counter to top of splash with no joints from horizontal to vertical application. No joints shall occur at sink openings.

3. At exposed countertop end corners, provide one-inch (1”) radius, or similar safety treatment.

J. End Panels and Filler Strips: Match adjacent case-piece.

K. Edging:
1. Provide the following in accordance with “Edging Locations:”
   p. Flat edge PVC: 0.020 inch. Solid, high-impact, purified, color-thru, acid resistant, machine-applied with hot melt adhesives.
   q. Three-millimeter (3 mm) PVC: Solid, high-impact, purified, color-thru, acid resistant, pre-lamination primed edging, machine-applied with hot melt adhesives, and machine profiled to 1/8-inch radius.
2. Edging locations:
   r. Cabinet body edge, including door/drawer front spacer rail: Flat edge PVC, color matched to door/drawer face or as selected.
   s. Forward edge of interior body components, interior dividers, shelf, and top edges of drawer body: Flat edge PVC to match cabinet interior surface color.
   t. Door/drawer-front edging: Three-millimeter (3 mm) PVC, color matched to standard laminates.

2.6 MATERIALS

A. Stainless-Steel Sheet: ASTM A240/A240M, Type 304.

B. Sealant for Countertops - Manufacturer's standard sealant of characteristics indicated that complies with applicable requirements. See related Sections:
1. Mildew-Resistant Joint Sealant: Mildew resistant, single component, nonsag, neutral curing, silicone.
2. Joint Sealant: Single component, nonsag, neutral curing, silicone; Class 25
3. Color: Clear.

2.7 STAINLESS-STEEL COUNTERTOPS

A. Countertops - Fabricate from 0.062-inch- (1.59-mm-) thick, stainless-steel sheet. Provide smooth, clean exposed tops and edges in uniform plane, free of defects. Provide front and end overhang of 1 inch (25 mm) over the base cabinets:
1. Joints: Fabricate countertops seamless
2. Weld shop-made joints.
3. Sound deaden the undersurface with heavy-build mastic coating.
4. Extend the top down to provide a 1-inch- (25-mm-) thick edge with a 1/2-inch (12.7-mm) return flange.
5. Form the backsplash coved to and integral with top surface, with a 1/2-inch- (12.7-mm) thick top edge and 1/2-inch (12.7-mm) return flange.
6. Provide raised (marine) edge around perimeter of tops containing sinks; pitch tops containing sinks two ways to provide drainage without channeling or grooving.
7. Where stainless-steel sinks occur in stainless-steel tops, factory weld into one integral unit.

PART 3

3.1 SHELVING

A. Closet and Utility Shelving:
1. Grade: WI Custom.
2. Shelf material: 3/4 inch (19 mm) medium density fiberboard with solid lumber edge.

3. Cleats: 3/4-inch (19 mm) solid lumber.

B. Pantry (217) Shelving
1. Stainless Steel Shelving

3.2 SHOP FINISHING

A. Grade: Woodwork Institute Premium grade.

B. Shop finish architectural woodwork at fabrication shop. Defer final touchup, cleaning, and polishing until installation.

C. Produce finish architectural woodwork at fabrication shop. Defer only final touchup, cleaning, and polishing until after installation.

D. Preparations for Finishing:
1. Comply with referenced quality standard for sanding, filling countersunk fasteners, sealing concealed surfaces, and similar preparations for finishing architectural woodwork, as applicable to each unit of work:
a. Back priming: Apply one (1) coat of sealer or primer, compatible with finish coats, to concealed surfaces of woodwork. Apply two (2) coats to back of paneling and to end grain surfaces. Concealed surfaces of plastic laminate clad woodwork do not require back priming when surfaced with plastic laminate, backing paper, or thermoset decorative overlay.

E. Exposed Surfaces - WI Premium Grade:
1. Plastic laminate finish: Use hot plate method for gluing of plastic laminate surfacing materials; glued surfaces shall be in close contact throughout. Glue stains are not permitted.
2. Solid surfacing finish: Refer to drawings and material schedule

F. Unexposed Wood Finish: Water based alkyd type primer/sealer.

PART 4 EXECUTION

4.1 PROJECT CONDITIONS

A. Environmental Limitations: Do not deliver or install woodwork until building is enclosed, wet work is complete, and HVAC system is operating and maintaining temperature and relative humidity at occupancy levels during the remainder of the construction period.

B. Field Measurements:
1. Where woodwork is indicated to fit to other construction, verify dimensions of other construction by field measurements before fabrication, and indicate measurements on shop drawings. Coordinate fabrication schedule with construction progress to avoid delaying the Work:
a. Locate concealed framing, blocking, and reinforcements that support woodwork by field measurements before being enclosed and indicate measurements on shop drawings.
b. Established dimensions: Where field measurements cannot be made without delaying the Work, establish dimensions and proceed with fabricating woodwork without field measurements. Provide allowance for trimming at site, and coordinate construction to ensure that actual dimensions correspond to established dimensions.

4.2 COORDINATION

A. Coordinate sizes and locations of framing, blocking, furring, reinforcements, and other related units of Work specified in other Sections to ensure that interior architectural woodwork will be supported and installed as indicated.

4.3 PREPARATION

A. Before installation, condition woodwork to average prevailing humidity conditions in installation areas. Before installing architectural woodwork, examine shop fabricated work for completion and complete work as required, including removal of packing and back priming.

4.4 INSTALLATION

A. Grade: Install woodwork to comply with requirements for grade specified for fabrication of type of woodwork involved.

B. Assemble woodwork and complete fabrication at site to comply with requirements for fabrication in Part 2, to extent that it was not completed in the shop. Install woodwork level, plumb, true, and straight. Shim as required with concealed shims. Install level and plumb (including tops) to a tolerance of 1/8 inch in 96 inches (3 mm in 2,400 mm). Scribe and cut woodwork to fit adjoining work, refinish cut surfaces, and repair damaged finish at cuts.

C. Fire Retardant Treated Wood: Handle, store, and install fire retardant treated wood to comply with chemical treatment manufacturer's written instructions, including those for adhesives used to install woodwork.

D. Anchor woodwork to anchors or blocking built in or directly attached to substrates. Secure with countersunk, concealed fasteners and blind nailing as required for complete installation. Use fine finishing nails (or finishing screws) for exposed fastening, countersunk, and filled flush with woodwork and matching final finish if transparent finish is indicated.

E. Plastic Laminate Paneling:
   1. Install paneling to comply with same grade as paneling to be installed:
      a. Install paneling level, plumb, true, and straight with no distortions. Shim as required with concealed shims. Install level and plumb to a tolerance of 1/8 inch in 96 inches (3 mm in 2,400 mm). Install with no more than 1/16 inch in 96 inches (1.6 mm in 2,400 mm) vertical cup or bow and 1/8 inch in 96 inches (3 mm in 2,400 mm) horizontal variation from a true plane.
      b. Anchor paneling to supporting substrate with blind nailing. Do not use face fastening unless covered by trim.

F. Cabinets:
   1. Install without distortion so doors and drawers fit openings properly and are accurately aligned. Adjust hardware to center doors and drawers in openings and to provide unencumbered operation. Complete installation of hardware and accessory items as indicated:
      a. Install cabinets with no more than 1/8 inch in 96 inches (3 mm in 2,400 mm) sag, bow, or variation from a straight line.
      b. Maintain veneer sequence matching of cabinets with transparent finish.
      c. Fasten wall cabinets through back, near top and bottom, at ends and not more than 16 inches (400 mm) o.c. with No. 10 wafer head screws sized for 1 inch (25 mm) penetration into wood framing, blocking, or hanging strips or toggle bolts through metal backing or metal framing behind walls.

G. Countertops:
   1. Anchor securely by screwing through corner blocks of base cabinets or other supports into underside of countertop:
      a. Install countertops with no more than 1/8 inch in 96 inches (93 mm in 2,400 mm) sag, bow, or variation from a straight line.
      b. Secure backsplashes to tops with concealed metal brackets at 16 inches (400 mm) o.c. and to walls with adhesive.
      c. Caulk space between backsplash and wall with silicone sealant.

H. Solid Surface and Stone Countertop:
   1. Install components plumb and level scribed to adjacent finishes. Fabricate with backsplashes. Sand minor scratches and stain:
      a. Align adjacent stone and solid surfacing material countertops and form seams to comply with manufacturer's written recommendations using adhesive in color to match countertop. Carefully dress joints smooth, remove surface scratches, and clean entire surface.
      b. Do not cut in field unless otherwise indicated. If countertops or splashes require additional fabrication not specified to be performed at site, return to fabrication shop for adjustment.
      c. Form field joints using manufacturer's recommended adhesive, with joints inconspicuous in finished work.
      d. Set stone and solid surface materials to comply with requirements indicated on Drawings and shop drawings. Shim and adjust to locations indicated, with uniform joints of widths indicated and with edges and faces aligned according to established relationships and indicated tolerances. Install anchors and attachments indicated or necessary to secure countertops in place.
      e. Where backsplash is indicated, install backsplash and end splash by adhering to wall with water-cleanable epoxy adhesive and to countertops with adhesive. Mask areas of countertops and splashes adjacent to joints to prevent adhesive smears.
      f. Adhesive top mount sinks/bowls to countertops using manufacturer's recommended adhesives and color matched silicone sealants.
      g. Keep components clean during installation. Remove adhesives, sealants, and stains. Replace stained components.
      h. Apply sealant to joints and gaps; comply with Section 07 92 00: Joint Sealants. Remove temporary shims before applying sealant.
      i. Make plumbing connections to sinks in accordance with plumbing requirements.
      j. Protect surfaces from damage. Repair work or replace damaged work that cannot be repaired to Architect's satisfaction.

I. Closet and Utility Shelving:
   1. Cut shelf cleats at ends of shelves about 1/2 inch (13 mm) less than width of shelves and sand exposed ends smooth:
      a. Install shelf cleats by fastening to framing or backing with finish nails or trim screws, set below face and filled. Space fasteners maximum 16 inches (400 mm) o.c.
      b. Install shelf brackets according to manufacturer's written instructions, spaced maximum 36 inches (900 mm) o.c. Fasten to framing members, blocking, or metal backing, or use toggle bolts or hollow wall anchors.
      c. Install standards for adjustable shelf supports according to manufacturer's written instructions. Fasten to framing members, blocking, or metal backing, or use toggle bolts or hollow wall anchors. Space fasteners maximum 12 inches (300 mm) o.c.
      d. Install standards for adjustable shelf brackets according to manufacturer's written instructions, spaced maximum 36 inches (900 mm) o.c. and within six inches (150 mm) of end of shelves. Fasten to framing members, blocking, or metal backing, or use toggle bolts or hollow wall anchors.
      e. Cut shelves to neatly fit openings with only enough gap to allow shelves to be

removed and reinstalled. Install shelves, fully seated on cleats, brackets, and supports:
1) Fasten shelves to cleats with finish nails or trim screws, set flush.
2) Fasten shelves to brackets to comply with bracket manufacturer's written instructions.

J. Touch up finishing work. Fill nail holes with matching filler where exposed.

K. Construction Tolerances:
1. Variation from plumb: For vertical lines and surfaces, do not exceed 1/16 inch in 48 inches (1.5 mm in 1,200 mm).
2. Variation from level: Do not exceed 1/8 inch in 96 inches (3 mm in 2,400 mm), 1/4-inch (6 mm) maximum.
3. Variation in joint width: Do not vary joint thickness more than 1/4 of nominal joint width.
4. Variation in plane at joints (lipping): Do not exceed 1/64-inch (0.4 mm) difference between planes of adjacent units.
5. Variation in line of edge at joints (lipping): Do not exceed 1/64-inch (0.4 mm) difference between edges of adjacent units, where edge line continues across joint.

4.5 SITE ENVIRONMENTAL PROCEDURES

A. Indoor Air Quality: Provide temporary ventilation during work.

B. Waste Management:
1. Comply with requirements of Section 01 74 19: Construction Waste Management and Disposal:
a. Select wood sizes to minimize waste; reuse scrap to the greatest extent possible. Clearly separate scrap for use on site as accessory components, including shims, bracing, and blocking.
b. Do not leave wood, shavings, sawdust, etc. on the ground or buried in fill.
c. Prevent saw dust and wood shavings from entering the storm drainage system.
d. Do not burn scrap lumber that has been pressure treated.
e. Do not send lumber treated with pentachlorophenol, CCA, or ACA to cogeneration facilities or waste to energy facilities.

4.6 ADJUSTING AND CLEANING

A. Repair damaged and defective woodwork, where possible, to eliminate functional and visual defects; where not possible to repair, replace woodwork. Adjust joinery for uniform appearance.

B. Clean, lubricate, and adjust hardware.

C. Clean woodwork on exposed and semi-exposed surfaces. Touch up shop applied finishes to restore damaged or soiled areas.

D. Countertops:
1. Clean countertops as work progresses. Remove adhesive, grout, mortar, and sealant smears immediately:
a. In-progress cleaning: Clean countertops as work progresses. Remove adhesive, grout, mortar, and sealant smears immediately.
b. Remove and replace countertops that are:
1) Broken, chipped, stained, or otherwise damaged. Stone may be repaired if methods and results are approved by Architect. Repair solid surface in accordance with manufacturer recommendations when approved by

Architect.

2) Defective countertops.
3) Defective joints, including misaligned joints.

c. Replace complying with requirements and showing no evidence of replacement.

4.7 PROTECTION

A. Provide final protection and maintain conditions, acceptable to manufacturer and installer, ensuring woodwork is without damage or deterioration at time of Substantial Completion.

END OF SECTION 06 40 00

SECTION 06 41 16 PLASTIC-LAMINATE-CLAD ARCHITECTURAL CABINETS

1. PART 1 GENERAL

1.1 SECTION INCLUDES

A. Special fabricated cabinet units.

B. Countertops.

C. Preparation for utilities.

D. Cabinet hardware.

E. Glass for cabinet units.

1.2 REFERENCES

A. WI - Woodwork Institute of California: North American Architectural Woodwork Standards 3.1. (NAAWS)

B. ASTM A167 - Stainless and Heat-Resisting Chromium-Nickel Steel Plate, Sheet, and Strip.

C. ASTM A653 - Steel Sheet, Zinc Coated, (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process.

D. ASTM A924 - General Requirements for Steel Sheet, Zinc-Coated (Galvanized) by the Hot-Dip Process.

E. ASTM C615 – Standard Specification for Granite Dimension Stone.

F. ASTM E84 – Test Method for Surface Burning Characteristics of Building Materials.

G. CBC – California Building Code, (CCR) California Code of Regulations, Title 24, Part 2.

1.3 QUALITY ASSURANCE - MONITORED COMPLIANCE PROGRAM

A. Manufacture casework items in accordance with quality standards of the North American Architectural Woodwork Standards of the Woodwork Institute.

B. All millwork and the installation of millwork shall be monitored for compliance under the scope of the WI Monitored Compliance Program (MCP).

C. Fees charged by the Woodwork Institute for their monitored compliance service are the responsibility of the casework manufacturer.

D. Provide WI Inspection Service at the millwork fabricator. Provide to Architect a written report showing the results of the inspection.

E. Provide WI Certified Compliance Labels on all items of casework and countertops.

F. Provide WI Inspection Service at the job site. Provide to Architect a written report showing the results of the inspection.

G. Self Certification by the millwork fabricator or inspection by other than an authorized representative of The Woodwork Institute is not acceptable.

H. Upon completion of the installation, provide a WI Monitored Compliance Certificate.

1.4 REGULATORY REQUIREMENTS

A. Conform to CBC requirements for flame spread classification in accordance with CBC Section 803 and Table 803.11.

B. Conform to Flame Spread Classifications for Interior Millwork for flame spread ratings as tested according to ASTM E84.

C. Materials of this section shall meet the requirements for formaldehyde as specified in the California Air Resources Board's Air Toxics Control Measure (ATCM) for Composite Wood (17CCR 93120 et seq.).

D. Operable parts for all accessible casework shall comply with CBC Section 11B-309.

1.5 MOCKUP

A. Prepare mockup under provisions of Section 01 43 00.

B. Provide full size base cabinet and upper cabinet of each type indicated, in specified finish with hardware installed.

C. Units will be examined to ascertain quality and conformity to WI standards.

D. Units will establish a minimum standard of quality for this work.

E. Approved units may be used as part of the Work.

1.6 DELIVERY, STORAGE, AND HANDLING

A. Deliver, store, and protect products to site under provisions of Section 01 61 00.

B. Conform to Section 2 of the North American Architectural Woodwork Standards for a climate controlled application.

C. Delivery of casework shall be made only when the area of installation is enclosed, all plaster and concrete work is dry, the area is broom clean and environmental conditions are as specified.

1.7 ENVIRONMENTAL CONDITIONS

A. Area of casework installation shall be fully enclosed, well ventilated, and protected from direct sunlight, excessive heat, rain and moisture.

B. Relative humidity of the area of casework installation shall be maintained between 25 percent and 55 percent with a temperature range of between 60 degrees F to 90 degrees F.

C. Casework shall be acclimated to the area of installation for a minimum of 72 hours prior to installation.

1.8 SUBMITTALS

A. Submit shop drawings and product data under provisions of Section 01 33 00.

B. Include materials, component profiles, fastening methods, assembly methods, joint details, accessory listings, schedule of finishes and keying plan.

C. Provide WI Certified Compliance Label for the Certified Seismic Installation Program on the first page of shop drawings.

D. Provide WI Certified Compliance label on first page of shop drawings. Include WI inspector's signature.

E. Provide WI certificates of compliance and inspection reports.

1.9 WARRANTY

A. Provide manufacturer's 10 year warranty for solid surface countertops under provisions of Section 01 77 00.

B. Warranty to provide for repair or replacement of countertop material if material fails due to manufacturing defect.

2. PART 2 PRODUCTS

2.1 ACCEPTABLE MANUFACTURERS

A. Active member of the Woodwork Institute licensed by WI to provide WI Certified Compliance Certificates and Labels for the products and materials specified in this section www.woodworkinstitute.com.

B. Substitutions: Under provisions of Section 01 25 13.

2.2 MATERIALS

A. Material shall conform to standards of the North American Architectural Woodwork Standards as follows: Section 3, Section 4, Section 10, and Section 11.

2.3 CABINET DESIGN

A. Individual cabinets are indicated on the drawings by the WI Cabinet Design Series (CDS) numbering system, Design Ideas.

2.4 MODULAR CASEWORK - LAMINATED PLASTIC COVERED

A. Fabricate in accordance with Section 10 of the North American Architectural Woodwork Standards.

1. WI Grade: Premium
2. Core Material: Combination Core, PureBond Classic Core, www.columbiaforestproducts.com or Pro-Core, www.timberproducts.com

3.	Core Material (Doors and Drawers)	Medium Density Fiberboard (MDF)
4.	Construction:	Style - Frameless
5.	Joinery:	Doweled Joints.
6.	Cabinet Backs:	Blind Dadoed.
7.	Cabinet Door Type:	Flush overlay with removable synthetic retainer for glass
8.	Base:	Moisture resistant.
9.	Shelves:	1-M-2 particle board, with HPDL two sides, 1 inch thick, MOE of 710,000
10.	Shelf Edge Bands	0.028 inch high pressure plastic laminate in color to match shelf. All 4 edges of adjustable shelves to receive banding.
11.	Door and Drawer Edge Bands:	0.028 inch high pressure plastic laminate the same as exposed faces.
12.	Exposed Surfaces (Including shelves and interior of open front cabinets):	0.028 inch high pressure plastic laminate, color and pattern as selected by Architect. A maximum of 5 colors and patterns to be selected. A minimum of 3 color combinations per room may be selected.
13.	Semi-Exposed Surfaces (Behind doors and inside drawers):	Low pressure decorative polyester or melamine laminate 0.020 inch thick in complimentary color to exposed surfaces as selected.
14.	Security and Dust Panels:	Particle board, 3/4 inch thick at all lockable drawers.
15.	**Basis of Design:**	Laminate Colors and Pattern: Manufacturer: Arborite Color: W202 Classic Artisan Walnut and W205 Noble Artisan Walnut Finish: AW Location: Refer to interior elevations, floor plans, and finish schedule
16.	Substitutions:	Under the provisions of Section 01 25 13.

2.5 STAINLESS STEEL COUNTERTOPS

A. Stainless Steel: ASTM A167, Type 304, No. 4 finish, 0.050 inch thick.

B. Core: Particleboard, minimum 3/4 inch thick.

C. Edge: Marine edge, 1-1/2 inch total thickness.

D. Backsplash: Integral cove with 1-1/2 inch total thickness. 4 inch height.

E. Seams: Continuous welded seams. Grind smooth.

2.6 SOLID POLYMER COUNTERTOPS

A. Manufacturers:

1. Basis of Design: Corian by DuPont, Product: Corian, www.corian.com.

2. LG Chemical, Product: Hi-Macs, www.hi-macs.com.

3. Substitutions: Under provisions of Section 01 25 13.

B. Fabricate solid polymer tops and splashes in accordance with the following:

1.	Top Thickness	:	0.50 inch
2.	Edge Detail	:	1.50 inch thick
3.	Backsplash	:	0.75 inch thick; Integral coved. 4 inch height.
4.	Top of Backsplash	:	Eased.
5.	Color	:	Solid Surface Manufacturer: Corian Colors: Ash Aggregate, Ash Concrete, Pearl Gray (Window trim)

C. Sinks at crew dorm restrooms, American Standard (A/S) No. 0496.221 “OVALYN II UNDERCOUNTER LAVATORY”, 20" x 17", UNDERCOUNTER MOUNTED, VITREOUS CHINA, under-mount with all mounting hardware concealed, continuous flow from countertop into sink (no drip edge). Color: white.

2.7 GLAZING

A. Glass Doors: 1/4 inch thick clear laminated safety glazing with all exposed edges ground.

B. Glass Shelves: 5/8 inch thick laminated safety glazing with all exposed edges ground.

2.8 HARDWARE

A. Finish: Stainless Steel.

B. Shelf Supports: Metal or molded polycarbonate clips set in drilled holes spaced 32 mm on center. Clips to have vertical locating pin for retention of shelf.

C. Drawer and Door Pulls: **Basis of Design:** Epco BP128-SS Bar Pull.

1. Amerock Stainless Steel Cabinet Pull BP19003 SS or BP19004SS.

D. Cabinet Locks: Olympus 700SC/800SC or CompXNational C9001SC/C9003SC.

E. Drawer Slides for Drawers 24 inch Wide or Less: Accuride 7432 with soft-close mechanism.

F. Drawer Slides for Drawers over 24 inch Wide: Accuride 3640 with soft-close mechanism.

G. Drawer slides for File Drawers: Accuride 4034.

H. Hinges: Rockford Process Control, No. 374, or Terry Hinge H08-99L60, heavy duty wrap-around, extended panel, tight pin butts of steel, 2-3/4 inch minimum width with companion magnetic door catch capable of a minimum 10 pound pull capacity. Hafele, Aximat hinge.

I. Sliding Door Track Assemblies: Grant 2023N sheaves and Grant 2011 track.

J. Grommets: Doug Mockett and Company, Inc., www.mockett.com. SG Series; plastic 1-3/4 inch diameter, 30 required. TM12B - 12" Dia. x 3" Deep stainless steel trash grommet at kitchen island (2) CP2 - 12" Black plastic paper slot grommet for communication countertop in apparatus bay (1).

K. Hanger Rods: 1-1/16 inch diameter tubing, stainless steel. KNAPE AND VOGT 770 with matching wall mounted end flanges .

L. Countertop Support Bracket: Premanufactured angled steel bracket, black paint finish, minimum 1,000 lb. load support capability. Concealed Bracket A & M Hardware, Inc.www.aandmhardware.com.

1. C-18 - Kitchen Island.

2. C-24 - Office and dorm room desks.

M. Remainder of hardware required shall meet requirements of ANSI/BHMA Grade 1.

N. Plumbing and electrical service fixtures as indicated in Division 22 and Division 26.

O. Substitutions: Under the provisions of Section 01 25 13.

2.9 FABRICATION

A. Shop assemble casework for delivery to site in units easily handled and to permit passage through building openings.

B. When necessary to cut and fit on site, provide materials with ample allowance for cutting. Provide trim for scribing and site cutting.

C. Provide cutouts for plumbing fixtures, inserts, appliances, outlet boxes, and other fixtures and fittings. Verify locations of cutouts from on-site dimensions. Seal contact surfaces of cut edges.

D. Before installation, seal unfinished material installed for backs, bases, self-edge backing, stripping and other concealed portions with a water-repellant sealer.

E. Provide all support and required inserts for below counter type sink units.

F. Install plastic grommets in the field in plastic laminate casework and Owner furnished furniture as directed by the Owner's Representative and/or Architect.

G. Install one adjustable shelf for each 1'-0" of height for all wall mounted cabinets.

H. Provide stretcher at top face of all door and drawer fronts.

I. Provide locks as indicated at location shown on drawings for both doors and drawers.

J. Provide locks as indicated on the schedule.

3. PART 3 EXECUTION

3.1 INSPECTION

A. Verify adequacy of backing and support framing.

3.2 INSTALLATION

A. Set and secure casework in place rigid, plumb, and level.

B. Install casework in accordance with Section 10 of the North American Architectural Woodwork Standards.

C. Install casework items in accordance with the Woodwork Institute's Certified Seismic Installation Program (CSIP)

D. Install countertops in accordance with Section 11 of the North American Architectural Woodwork Standards.

3.3 ADJUSTING AND CLEANING

A. Adjust doors, drawers, hardware, fixtures and other moving or operating parts to function smoothly and correctly.

B. Clean casework, counters, shelves, hardware, fittings and fixtures.

END OF SECTION 06 41 16

SECTION 07 13 53 ELASTOMERIC SHEET WATERPROOFING

1. PART 1 GENERAL

1.1 SECTION INCLUDES

A. Below grade membrane waterproofing at elevator pit.

B. Protection board.

1.2 REFERENCES

A. ASTM C578 - Preformed, Cellular Polystyrene Thermal Insulation.

B. ASTM D412 - Rubber Properties in Tension.

C. ASTM D570 - Method for Water Absorption of Plastics.

D. ASTM D1970 - Specification for Self Adhering Polymer Modified Bituminous Sheet Materials.

E. ASTM E96 - Water Vapor Transmission of Materials in Sheet Form.

F. ASTM E154 - Water Vapor Retarders Used in Contact with Earth, Under Concrete Slabs, on Walls, or as Ground Cover.

1.3 SYSTEM DESCRIPTION

A. Waterproofing System: Sheet membrane capable of resisting water head of 200 feet and preventing moisture migration to interior.

1.4 SUBMITTALS

A. Submit product data under provisions of Section 01 33 00.

B. Submit manufacturer's installation instructions under provisions of Section 01 33 00.

C. Submit manufacturer's inspection reports under provisions of Section 01 33 00.

1.5 QUALITY ASSURANCE

A. Perform work in accordance with manufacturer's recommendations.

B. Maintain one copy of document on site.

1.6 QUALIFICATIONS

A. Manufacturer: Company specializing in the manufacture of products specified in this Section with minimum five years documented experience.

B. Applicator: Company specializing in applying the work of this Section with minimum three years documented experience and approved by manufacturer.

1.7 PRE-INSTALLATION CONFERENCE

A. Convene a conference two weeks prior to commencing work of this Section, under provisions of Section 01 31 00.

B. Require attendance of parties directly affecting the work of this Section.

1.8 DELIVERY, STORAGE, AND HANDLING

A. Deliver, store and protect products to site under provisions of Section 01 61 00.

1.9 REGULATORY REQUIREMENTS

A. Comply with all current federal, state, and local volatile organic compound (VOC) regulations.

B. Do not use solvent based primers containing 1-1-1 trichloroethane or asphalt emulsions.

1.10 ENVIRONMENTAL REQUIREMENTS

A. Do not apply products when surface or ambient temperature is below 25 degrees F.

B. Do not apply to damp or frozen surfaces or during inclement weather.

1.11 SEQUENCING AND SCHEDULING

A. Coordinate work under the provisions of Section 01 31 00.

B. Coordinate work of this Section with foundation and backfilling requirements.

C. Coordinate work of this Section with concrete elevator pit.

1.12 WARRANTY

A. Provide 5 year warranty under provisions of Section 01 77 00.

B. Furnish manufacturer's warranty that materials will be free of defects in manufacture.

C. Furnish applicator's warranty that the installation of materials will provide a leak free system.

2. PART 2 PRODUCTS

2.1 MANUFACTURERS

A. GCP Applied Technologies; Product - Bituthene System 3000, www.gcpat.com.

B. Pecora Corporation; Product - Duramem 700-SM, www.pecora.com.

C. Carlisle Inc; Product - CCW Miradri 860, www.carlisleccw.com.

D. MAPEI Corporation; Product - Mapethene HT, www.mapei.com.

E. Polyguard Products, Inc.; Product-Polyguard 650, www.polyguardproducts.com.

F. W.R. Meadows, Inc.; Product - Mel-Rol., www.wrmeadows.com.

G. Tamko Products, Inc.; Product-TW-60, www.tamko.com.

H. Substitutions: Under provisions of Section 01 25 13.

2.2 MEMBRANE MATERIALS

A. Self-adhesive, cold-applied waterproofing sheet membrane consisting of a cross-laminated polyethylene film and rubberized asphalt of a thickness of .060 inches (60 mils) by 36 inch wide rolls, inter-wound with a disposable silicone-coated release sheet; conforming to the following:

Properties	Test	Results
Pliability, 180 degrees bend over 1 inch mandrel at - 45 degrees F	ASTM D1970	Unaffected
Tensile Strength (membrane)	ASTM D412	250 psi
Tensile Strength (film)	ASTM D412	5000 psi
Elongation	ASTM D412	300 percent
Puncture Resistance (membrane)	ASTM E154	40 lb
Permeance	ASTM E96 (Method B)	0.05 grains/sq. ft./ hr./in Hg
Water Absorption	ASTM D570	0.1 percent

2.3 ACCESSORIES

A. Surface Conditioner: Acrylic latex diluted with water.

B. Mastic: Rubberized asphaltic type recommended by membrane manufacturer.

C. Liquid Membrane: Two component elastomeric, mastic grade.

D. Cement Mortar: Epoxy or latex modified cementitious composition acceptable to membrane manufacturer.

E. Concrete Patching Compound: Fast setting, non-shrinking patching compound, of type acceptable to membrane manufacturer.

F. Tape: 2 sided adhesive tape acceptable to membrane manufacturer.

2.4 PROTECTION BOARD

A. Asphaltic Protection Board: Two layers of premolded asphaltic hardboard sheet 1/4 inch thick, for horizontal application.

B. Polystyrene Protection Board: ASTM C578 expanded polystyrene board, 1 inch minimum thickness, for vertical application.

C. Protection Board Adhesive: Type recommended by board manufacturer and compatible with membrane.

3. PART 3 EXECUTION

3.1 EXAMINATION

A. Examine surfaces for conditions that would adversely affect execution. Do not proceed until unsatisfactory conditions are corrected. Beginning of installation constitutes acceptance of conditions.

B. Ensure surfaces are reasonably smooth and free of holes, cracks or projections which might be detrimental to successful installation.

C. Verify that items penetrating waterproofing system are securely installed.

D. Verify that concrete surfaces have cured a period of time acceptable to membrane manufacturer.

E. Verify that masonry joints are struck flush with face of unit or that a parge coat of mortar has been applied to face of masonry.

3.2 PREPARATION

A. Protect adjacent surfaces not designated to receive waterproofing.

B. Clean and prepare surfaces in accordance with manufacturer's instructions.

C. Seal cracks and joints in accordance with manufacturer's instructions. Use proper depth-width ratio recommended by sealant manufacturer.

D. Remove sharp projections, fins, and loose material. Remove form ties to 3/4 inch minimum behind face of wall. Fill holes, voids, and honeycomb areas flush with concrete patching compound or cement mortar.

E. Seal penetrations in accordance with manufacturer's instructions.

F. Provide fillet or cant at junction of vertical and horizontal surfaces using liquid membrane. Extend liquid membrane 6 inches each way from corner at a minimum 90 mil thickness.

3.3 WATERPROOFING INSTALLATION

A. Install products in accordance with manufacturer's printed instructions.

B. Extend membrane onto footing except terminate at point 12 inches below floor slab of protected space where footings are at greater depth.

C. Apply latex surface conditioner at rate indicated by manufacturer. Condition only as much area as can be covered in same day.

D. Prior to placing full membrane, install minimum 3/4 inch cant of liquid membrane, extending 6 inches each way at a minimum 90 mil thickness. Provide membrane strips at inside corners, outside corners, and working joints. Center strips along axis of corner and/or joint.

E. Install sheets with edges and ends overlapped at dimensions recommended by manufacturer.

F. Remove release paper layer. Roll out surface with mechanical roller to encourage full contact bond.

G. Completely bond sheet to substrate, except those areas directly over or within 3 inches of working cracks or expansion joints.

H. Place uniform bead of mastic to joint edges at locations recommended by manufacturer.

I. Seal perimeter ends and edges to adjoining surfaces.

J. Seal items penetrating membrane with flashing membrane material and liquid membrane, ensuring positive seal with membrane and penetrating member.

3.4 PROTECTION BOARD INSTALLATION

A. Install polystyrene protection board system over membrane and retain in place with adhesive in accordance with manufacturer's instructions.

B. Install asphalt protection board system in double layer with tight butt joints.

C. Install drainage panel system over membrane with spots of adhesive in accordance with manufacturer's instructions.

D. Place panel system with fabric facing out.

E. Overlap flanges of adjacent drain cores.

3.5 FIELD QUALITY CONTROL

A. Flood Tests - Horizontal Surfaces:

1. Before completed surfaces are covered by protection board or other work, test for leaks with 2 inch depth of water maintained for 48 hours.

2. Repair any leaks revealed by examination of substructure, and repeat test until no leakage is observed.

3.6 PROTECTION AND CLEANING

A. Protect adjacent surfaces from damages and stains. Clean materials from surfaces where inadvertently applied.

END OF SECTION 07 13 53

SECTION 07 18 00 TRAFFIC COATING

1. PART 1 GENERAL

1.1 SECTION INCLUDES

A. Trowel applied neoprene-rubber membrane coating.

1.2 REFERENCES

A. ADAAG - Americans with Disabilities Act (ADA) Accessibility Guidelines for Buildings and Facilities.

B. CBC - California Building Code, (CCR) California Code of Regulations, Title 24, Part 2, California State Accessibility Standards.

C. ASTM D570 - Standard Test Method for Water Absorption of Plastics.

D. ASTM E108 - Standard Test Methods for Fine Tests of Roof Coverings Fire Retardance.

E. ASTM F1869 - Standard Tet Method for Measuring Moisture Vapor Emission Rate of Concrete Subfloor Using Anhydrous Calcium Chloride.

F. ASTM G151 - Standard Practice for Exposing Nonmetallic Materials in Accelerated Test Devices.

G. FM (FM Global) - Roof Assembly Classifications.

1.3 REGULATORY REQUIREMENTS

A. Coating shall have a Class A fire resistance rating when tested according to ASTM E108.

B. Coating shall have been tested according to FM requirements to resist a wind uplift velocity of 130 mph.

C. Coating shall have a ceofficent of friction of 0.60 for flat surfaces and 0.08 for ramped surfaces.

1.4 SUBMITTALS

A. Submit product data, samples, and installation instructions under provisions of Section 01 33 00.

B. Product Data: Include product characteristics, limitations, and identify dissolving solvents, fuels, and potential destructive compounds.

C. Samples: Submit two samples, 3 x 4 inch in size illustrating color and installation of designated membrane and top coat.

D. Manufacturer's Installation Instructions: Include special environmental conditions required to install product and potential incompatibilities with adjacent materials.

E. Manufacturer's Certificate: Certify that products meet or exceed specified requirements.

1.5 MAINTENANCE DATA

A. Submit under provisions of Section 01 77 00.

B. Maintenance Data: Include procedures for stain removal, repairing surface, and cleaning.

1.6 QUALIFICATIONS

A. Manufacturer: Company specializing in manufacturing the product specified in this Section with minimum 10 years documented experience.

B. Applicator: Company specializing in performing the work of this Section with minimum 5 years documented experience, approved by manufacturer.

1.7 DELIVERY, STORAGE, AND HANDLING

A. Deliver, store, protect, and handle products to site under provisions of Section 01 61 00.

B. Keep away from fire or open flame.

1.8 ENVIRONMENTAL REQUIREMENTS

A. Do not install materials when temperature is below 50 degrees F or above 90 degrees F.

B. Maintain this temperature range 24 hours before, during and 72 hours after application.

C. Restrict traffic from area where materials are being installed or are curing.

1.9 WARRANTY

A. Provide five year warranty under provisions of Section 01 77 00.

B. Warranty: Include coverage for delamination of system from substrate and degradation of waterproofing ability.

2. PART 2 PRODUCTS

2.1 MANUFACTURERS

A. Crossfield Products Corp., Dex-O-Tex-Weatherwear, www.dexotex.com

B. Substitutions: Under provisions of Section 01 25 13.

2.2 MATERIALS

A. Slip Sheet: Asphalt - saturated glass fiber matting weighing not less than 11 lbs. per 100 square feet containing no organic fibers.

B. Intermediate Membrane: Non-directional glass fiber reinforced membrane weighing a minimum of 1 oz. per square foot.

C. Neoprene : Trowel applied neoprene waterproof surfacing with the following characteristics:

1.	Total System Thickness	:	3/16 to 1/4 inch
2.	Water Absorption per ASTM D570	:	6.09 percent maximum
3.	Weathering per ASTM G151	:	No effect
4.	Fire Resistance per ASTM E108	:	Class A
5.	VOC Content	:	Compliant with SCAQMD Rule 1168

D. Binder: All rubber emulsion compounded with liquid neoprene with solid content of 35 percent minimum.

E. Topping: Cementitious-neoprene compound.

F. Filler and Primer: As recommended by membrane manufacturer.

G. Final finish: Single component, acrylic latex emulsion, pigmented, slip resistant, color as selected by Architect.

H. Fabric Flashing: Woven polypropylene fabric weighing a minimum of 7-1/2 oz per sq ft.

3. PART 3 EXECUTION

3.1 EXAMINATION

A. Verify that substrate is ready to receive work, surface is clean, dry and free of substance which could affect bond.

B. Do not begin work until concrete substrate has cured 28 days, minimum, and measured moisture content is not greater than 12 percent and moisture vapor transmission is 3.0 lbs/1,000 sq ft per ASTM F1869.

3.2 PREPARATION

A. Clean substrate surface free of foreign matter.

B. Patch concrete substrate with latex filler to produce surface conducive to bond.

C. Install coved cant strips at intersecting of vertical surfaces.

D. Protect adjacent surfaces.

3.3 INSTALLATION

A. Apply system materials in accordance with manufacturer's instructions.

B. Apply slip sheet over substrate. Lap seams 2 inches.

C. Apply reinforced membrane at junction of vertical surfaces. Embed fabric into neoprene liquid membrane.

D. Apply neoprenene membrane solution with fabric reinforcement. Lap seams 2-inches.

E. Trowel apply two smoothing coats of neoprene and fine aggregate to achieve smooth, filled surface. Sand to remove marks and imperfections.

F. Roller apply two coats of final slip resistant finish uniformly over entire horizontal and vertical area.

G. Extend primer, slip sheet and membrane plies and top coat up intersecting and perimeter vertical surfaces, 4 inches high. Terminate top edge straight.

H. Finish to smooth level surface, sloped to drain.

I. Apply sealant to junction of horizontal and intersecting surfaces to achieve watertight seal.

3.4 PROTECTION OF FINISHED WORK

A. Protect finished work under provisions of Section 01 61 00.

B. Do not permit traffic over unprotected surfaces.

END OF SECTION 07 18 00

SECTION 07 19 00 WATER REPELLENTS

1. PART 1 GENERAL

1.1 SECTION INCLUDES

A. Water repellent coating.

B. Application schedule.

1.2 QUALITY ASSURANCE

A. Perform work in accordance with manufacturer's printed instructions.

B. Maintain one copy of document on site.

1.3 QUALIFICATIONS

A. Manufacturer: Company specializing in manufacture of water repellent coatings with five years minimum experience.

B. Applicator: Acceptable to manufacturer.

1.4 SUBMITTALS

A. Submit product data under provisions of Section 01 33 00.

B. Include details of product description, tests performed, limitations to coating, cautionary procedures required during application, and chemical properties, including percentage of solids.

C. Submit manufacturer's installation instructions under provisions of Section 01 33 00.

D. Submit manufacturer's certificate under provisions of Section 01 33 00 that products meet or exceed specified requirements and that their application was according to manufacturer's recommendation.

E. Submit manufacturer's certificate that products supplied comply with local regulations controlling the use of volatile organic compounds (VOC).

F. Submit manufacturer's test and inspection reports under provisions of Section 01 33 00.

1.5 WARRANTY

A. Provide manufacturer's 5 year warranty for materials and their installation.

B. Warranty: Maintain treated surface free from penetration of moisture. Repair damage to interior surface of walls that moisture has penetrated.

1.6 REGULATORY REQUIREMENTS

A. Comply with applicable codes and regulations of governmental agencies having jurisdiction including those having jurisdiction over airborne emissions and industrial waste disposal. Where those requirements conflict with this specification, comply with the more stringent provisions.

B. Comply with the current applicable regulations of the California Air Resources Board (CARB) and the Environmental Protection Agency (EPA).

1.7 ENVIRONMENTAL REQUIREMENTS

A. Do not apply coating when ambient temperature is lower than 50 degrees F or higher than 100 degrees F.

2. PART 2 PRODUCTS

2.1 ACCEPTABLE MANUFACTURERS

A. Degussa, www.protectosil.com.

B. Hydrozo, Inc., www.chemrex.com.

C. Monopole International, Inc., www.monopoleinc.com.

D. Okon, Inc., www.okoninc.com.

E. Pecora Corp., www.pecora.com.

F. Pro So Co., Inc. www.prosoco.com.

G. Substitutions: Under provisions of Section 01 25 13.

2.2 MATERIALS

A. Coatings: Clear, non-yellowing formulations containing no silicones.

B. Evonik Corp., Aqua-trete Concentrate.

C. Hydrozo, Inc., Enviroseal Double 7HD.

D. Monopole International, Inc., Aquaseal Micro Emulsion.

E. Okon, Inc., W1 Sealer.

F. Pecora Corp., Klere-Seal 920-W Silane/Siloxane.

G. Pro So Co., Sure Kleen Weather Seal Siloxane WB.

3. PART 3 EXECUTION

3.1 INSPECTION

A. Verify joint sealants are installed and cured.

B. Verify surfaces to be coated are dry, clean, and free of efflorescence, oil, or other matter detrimental to application of coating.

C. Beginning of installation means acceptance of substrate.

3.2 PREPARATION

A. Remove loose particles and foreign matter.

B. Remove oil or foreign substance with a chemical solvent which will not affect coating.

C. Protect adjacent surfaces not scheduled to receive coating.

D. If applied on unscheduled surfaces, remove immediately, by approved method.

3.3 FIELD QUALITY CONTROL

A. Field inspection and testing will be performed under provisions of Section 01 45 29.

B. Manufacturer of water repellant coating shall provide the following inspection services:

1. Application start-up inspection.

2. Periodic inspections during application.

3. Certification of materials and application.

3.4 APPLICATION

A. Delay work until substrate is cured a minimum of 30 days.

B. Apply coating in two continuous successive wet-on-wet applications in accordance with manufacturer's instructions, using airless spray with coverage, recommended by manufacturer for substrate being coated.

3.5 PROTECTION AND CLEANING

A. Protect adjacent surfaces from damages and stains.

B. Clean materials from surfaces where inadvertently applied.

C. Protect finished installation under provisions of Section 01 61 00.

3.6 SCHEDULE

A. Exterior concrete masonry unit yard walls.

B. Exterior vertical concrete surfaces.

C. Exterior vertical exposed to view concrete surfaces.

END OF SECTION 07 19 00

SECTION 07 21 15 CONTINUOUS WALL PANEL INSULATION

1. PART 1 GENERAL

1.1 SECTION INCLUDES

A. Continuous wall panel insulation with fire-treated plywood.

B. Fasteners and accessories.

1.2 REFERENCES

A. ASTM C 209 - Methods of Testing Insulating Board, Structural and Decorative.

B. ASTM C 518 - Steady State Thermal Transmission By Means Of The Heat Flow Meter Apparatus (R Value).

C. ASTM C 1289 - Specifications for Faced Rigid Cellular Polyisocyanurate Thermal Insulating Board.

D. ASTM D 1621 - Test Methods for Compressive Properties of Rigid Cellular Plastics.

E. ASTM D 2126 - Test Method for Response of Rigid Cellular Plastics to Thermal and Humid Aging.

F. ASTM D 3273 - Standard Test Method for Resistance to Growth of Mold on the Surface of Interior Coatings in an Environmental Chamber.

G. ASTM E 84 - Standard Test Method for Surface Burning Characteristics of Building Materials.

H. ASTM E 96 - Test Method for Water Vapor Transmission of Materials.

I. CBC - California Building Code, (CCR) California Code of Regulations, Title 24, Part 2.

J. NFPA 285 - Standard Fire Test Method for Evaluation Of Fire Propagation Characteristics Of Exterior Non-Load-Bearing Wall Assemblies Containing Combustible Components.

1.3 SYSTEM DESCRIPTION

A. NFPA 285 Exterior Wall Assembly - Concrete Base Wall:

1. Base Wall System:

(a) Cast in place concrete wall.

2. Exterior Finish:

(a) Natural Stone or Cast Artificial Stone: Minimum 1-1/4 inch Natural Stone Veneer or minimum 1-1/2 inch thick Cast Artificial Stone Veneer.

(b) Fiber Cement Board siding.]

3. Panel Thickness:

(a) 1.6 inches thick.

4. Stud Cavity: Not Applicable.

5. Exterior Sheathing: Not Applicable.
6. Floorline Firestopping: Not Applicable

7. Fluid Applied Membrane Applied to Concrete: Acceptable products as specified under Section 07 27 26.

8. Weather Resistive Underlayment Applied to Exterior Insulation: Acceptable products specified under other sections are:

(a) DuPont:

(1) Tyvek Commercial Wrap

(b) Dryline:

(1) Building Wrap CP

1.4 PERFORMANCE REQUIREMENTS

A. Physical Properties (Foam Core):

1. Flame Spread Index : ASTM E 84, less than 25.

2. Smoke Developed: ASTM E 84, less than 250.

3. Compressive Strength: ASTM D 1621; Grade 3, 25 psi.

4. Dimensional Stability: ASTM D 2126, 2 percent linear change.

5. Moisture Vapor Permeance: ASTM E 96, 1.1 perm.

6. Water Absorption: ASTM C 209, less than 0.1 percent by volume.

7. Service Temperature: Minus 100 degrees to 250 degrees F.

8. Resistance to Mold: ASTM D 3273 Passed.

9. Fire Retardant Treated Plywood:

(a) Flame Spread Index: ASTM E 84, less than 25.

(b) Smoke Developed: ASTM E 84, less than 250.

1.5 REGULATORY REQUIREMENTS

A. Continuous insulation wall panels shall meet the continuous insulation standards of CBC Chapter 26.

B. Continuous insulation wall panel system shall meet the requirements of NFPA 285.

1.6 SUBMITTALS

A. Submit under provisions of Section 01 33 00 01300.

B. Product Data: Manufacturer's data sheets on wall panels and fasteners to be used, including:

1. Preparation instructions and recommendations.

2. Storage and handling requirements and recommendations.
3. Installation methods.

1.7 QUALITY ASSURANCE

A. Quality Assurance: Under provisions of Section 01 43 00.

B. Manufacturer Qualifications: Manufacturer shall be a company that regularly manufactures and assembles specified insulation in house with no outside fabrication operations.

1.8 DELIVERY, STORAGE, AND HANDLING

A. Deliver, store and protect products to site under provisions of Section 01 61 00.

B. Store products off the ground, in dry conditions, under cover and in manufacturer's unopened packaging until ready for installation.

C. Protect against ignition at all times.

1.9 SEQUENCING

A. Sequence work under provisions of Section 01 11 00.

B. Coordinate with the installation of vapor retarders, air seal materials and underlayments.

C. Ensure that products of this section are supplied to affected trades in time to prevent interruption of construction progress.

1.10 ENVIRONMENTAL REQUIREMENTS

A. Maintain environmental conditions within limits recommended by manufacturer for optimum results.

B. Do not install products under environmental conditions outside manufacturer's recommended limits.

2. PART 2 PRODUCTS

2.1 MANUFACTURERS

A. Hunter Panels, ICC-ES ESR-3174 Model XCI Ply Class A, www.hunterpanels.com.

B. Substitutions: Under provisions of Section 01 25 13. 01630.

2.2 WALL PANEL INSULATION

A. Panel Insulation Bonded to Plywood: Class A rigid insulation panel composed of a closed cell polyisocyanurate foam with a premium performance coated glass facer on both sides bonded to fire treated plywood on one side.

1. Type: ASTM C 1289, Type II, Class 2, Grade 3, Type V.

2. Fire Retardant Treated Plywood Thickness: 5/8 inch.

3. Panel Size: 4 feet by 8 feet.

4. Thickness / R Value: based on ASTM C 518 at 75 degrees F.

(a) 1.6 inches / R Value 6.6 .

2.3 PANEL FASTENERS

A. As manufactured by Hunter Industries, www.hunterpanels.com, Wind-Lock Fasteners, www.wind-lock.com or Rodenhouse Fasteners, www.rodenhouse-inc.com.

B. Corrosion resistant type with oversized heads and washer plates.

C. Concrete and Masonry: Hunter # 10-Xci SIP-SD.

D. Substitution: Under provisions of Section 01 25 13.

3. PART 3 EXECUTION

3.1 EXAMINATION

A. Do not begin installation until exterior walls have been properly prepared.

B. Verify that all exterior wall assembly construction has been completed to the point where the insulation may correctly be installed.

C. Verify that mechanical and electrical services in walls have been installed and tested.

D. Verify that adjacent materials and finishes are dry and ready to receive insulation.

E. Notify Architect of unsatisfactory preparation before proceeding.

3.2 PREPARATION

A. Clean surfaces thoroughly prior to installation.

B. Prepare surfaces using the methods recommended by the manufacturer for achieving the best result for the substrate under the project conditions.

3.3 INSTALLATION

A. Install in accordance with manufacturer's instructions.

B. Install in exterior spaces without gaps or voids. Do not compress insulation.

C. Trim insulation neatly to fit spaces. Insulate miscellaneous gaps and voids.

D. Fit insulation tight in spaces and tight to exterior side of mechanical and electrical services within plane of insulation.

E. Install insulation with long dimension perpendicular to framing members.

F. Offset vertical joints in insulation a minimum of 6 inches.

G. Stagger insulation and sheathing joints a minimum of 6 inches.

H. Exposed insulation must be protected from open flame and kept dry at all times.

I. Fasten insulation to structural base wall as follows:

1. Concrete and Masonry: Minimum 1-1/2 inch embedment.

2. Space fasteners at 12 inches o.c.at perimeter of panel and at 16 inches o.c. at field of panel.

3. Set fasteners back from edge of panel 3/8 inch.

4. Drive fasteners so that washer plate is tight and flush with surface. Do not overtighten.

5. Coordinate with cladding or wall finish manufacturer for their attachment requirements over insulation panels.

J. Fluid applied membrane and Underlayment to be installed as specified in other sections of this specification.

K. Exterior finish to be installed as specified in other sections of this specification.

L. Wall panel insulation is not to be left exposed for extended periods of time. If extended exposure is anticipated in excess of 45 days, all exposed panel surfaces including corners, window and door openings, should be taped with a compatible waterproof tape.

3.4 PROTECTION

A. Protect installed products until completion of exterior wall finish.

B. Cover the top and edges of unfinished wall panel work to protect it from the weather and to prevent accumulation of water in the wall system.

C. Wet panels shall be allowed to completely dry prior to application of underlayment and exterior wall finish.

D. Repair or replace damaged products before completion of exterior wall finish.

END OF SECTION 07 21 15

SECTION 07 21 16 BLANKET INSULATION

1. PART 1 GENERAL

1.1 SECTION INCLUDES

A. Batt insulation and vapor barrier in exterior wall and deck construction.

B. Batt insulation for filling perimeter window and door shim spaces and crevices in exterior wall and roof.

C. Batt sound insulation in interior walls and partitions and between floor levels.

1.2 REFERENCES

A. ASTM C665 - Mineral Fiber Blanket Thermal Insulation for Light Frame Construction and Manufactured Housing.

B. ASTM C1320 - Installation of Mineral Fiber Batt and Thermal Insulation for Light Frame Construction.

C. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials.

D. CBC - California Building Code, (CCR) California Code of Regulations, Title 24, Part 6.

E. Business and Professions Code.

1.3 PERFORMANCE REQUIREMENTS

A. Materials of this Section shall provide continuity of thermal and moisture barrier at building enclosure elements.

B. Materials of this Section shall provide continuity of sound control where indicated or scheduled.

1.4 REGULATORY REQUIREMENTS

A. Installation of insulation may only commence if insulation meets mandatory manufacturer certification to the California Energy Commission required by Title 24, Part 6, Section 110.8 of the CBC - California Building Code, (CCR) California Code of Regulations that insulation complies with Title 24, Part 12, Chapter 12-13, Article 3 of the California Quality Standards for Insulating Materials.

B. Insulation products shall comply with the requirements of the California Department of Public Health's "Standard Method for the Testing and Evaluation of Volatile Organic Chemical Emissions from Indoor Sources Using Environmental Chambers."

C. Insulation materials to be certified in compliance with Business and Professions Code Section 19165.

D. Insulation manufacturer to be licensed by the California Department of Consumer Affairs, Bureau of Home Furnishing and Thermal Insulation according to Business and Professions Code, Section 19059.7.

1.5 SUBMITTALS

A. Submit manufacturer's certificates under provisions of Section 01 33 00 that materials meet or exceed specified regulatory requirements.

2. PART 2 PRODUCTS

2.1 MANUFACTURERS - INSULATION MATERIALS

A. Certain Teed Corp., www.certainteed.com.

B. Johns Manville Corp., www.jm.com.

C. Knauf Insulation, www.knaufinsulation.us.

D. Owens-Corning Fiberglass Corporation, www.owenscorning.com.

E. Substitutions: Under provisions of Section 01 25 13.

2.2 MATERIALS

A. Thermal Batt Insulation, Concealed Wall and Roof: ASTM C665 Preformed fiber glass batt, Type II Kraft Faced, Class C, Category 1 "SmartBatt", with stapling flange for attachment to applicable construction. Equivalent continuous roll membrane facing of "MemBrain" Continuous Air Barrier and Smart Vapor Retarder may be utilized in lieu of individual glass fiber batts. Provide R19 at walls.

B. Acoustical Batt Sound Insulation, Concealed Wall and Ceiling: ASTM C665 preformed glass fiber batt, Type I unfaced, with flame spread of 25 or less, and a smoke density of 450 or less when tested in accordance with ASTM E84. Provide[3-1/2], 6-1/2 inch thickness.

C. Insulation to be formaldehyde-free.

D. Nails or Staples: Steel wire; electroplated; type and size to suit application.

E. Tape: Bright aluminum self-adhering type, mesh reinforced, 2 inch wide.

F. Support Wire: 16 gauge steel wire.

G. Support Rods: 13 gauge, pointed spring steel length as required for stud spacing.

3. PART 3 EXECUTION

3.1 EXAMINATION

A. Verify that substrate, adjacent materials, and insulation are dry and ready to receive insulation.

B. Verify that enclosed spaces are ventilated to dissipate humidity.

C. Maximum relative humidity level of less than 50 percent shall be maintained during installation of insulation.

3.2 INSTALLATION

A. Install insulation in accordance with insulation manufacturer's instructions and ASTM C1320.

B. Install batt insulation in exterior walls spaces without gaps or voids.

C. Fill any small spaces around door frames, window frames, skylight frames, and other wall or roof openings with insulation.

D. Fill hollow space of steel door frame, steel window frame and other wall or roof frame with insulation.

E. Fill hollow space created by wall or roof framed headers and jamb spaces with insulation.

F. Install batt sound insulation in interior walls full height of wall.

G. Install batt sound insulation above ceilings in areas as indicated. Extend a minimum of 4’-0” beyond face of vertical dividing partitions of space to be insulated where partition terminates at ceiling.

H. Install batt sound insulation at underside of floor decking between adjacent floor levels.

I. Trim insulation neatly to fit spaces.

J. Fit insulation tight in spaces and tight to exterior side of mechanical and electrical services within the plane of insulation. Leave no gaps or voids.

K. Install with factory applied membrane facing warm side of building spaces.

L. Lap ends and side flanges of vapor barrier membrane over face of framing members.

M. Extend vapor barrier on to any adjacent construction and tape seal edge of vapor barrier.

N. Seal butt ends, lapped flanges, and tears or cuts in membrane with tape or another layer of membrane.

O. Seal joints in vapor barrier caused by pipes, conduits, electrical boxes, and similar items penetrating vapor barrier.

P. Face staple flange over flange of adjacent blanket to wood studs at maximum 6 inches oc.

Q. Friction fit sound insulation between studs and fill as required to completely fill space between the wall finishes.

R. Where wall finish does not occur, use support rods spaced not-to-exceed 16 inches oc vertically at wood studs.

S. Retain unsupported roof insulation to metal or concrete substrate with spindle fasteners at 24 inches on center.

END OF SECTION 07 21 16

SECTION 07 22 00 ROOF AND DECK INSULATION

1. PART 1 GENERAL

1.1 SECTION INCLUDES

A. Rigid foam insulation board at roof.

B. Tapered foam insulation board.

C. Protection board for roof insulation.

D. Mechanical fasteners.

E. Cant strips, saddles, cricketts and tapered edge strips.

1.2 REFERENCES

A. ASTM C209 - Cellulosic Fiber Insulating Board

B. ASTM C518 - Steady-State Heat Flux Measurements and Thermal Transmission Properties by Means of the Heat Flow Meter Apparatus.

C. ASTM C728 - Perlite Thermal Insulation Board.

D. ASTM C1177 – Standard Specification for Glass Mat Gypsum Substrate for Use as Sheathing.

E. ASTM C1289 - Standard Specification for Rigid Cellular Thermal Insulation Board.

F. ASTM C1303 - Standard Test Method for Estimating the Long-Term Thermal Resistance of Closed Cell Foam Insulation.

G. ASTM D1622 - Apparent Density of Rigid Cellular Plastics.

H. ASTM E84 - Surface Burning Characteristics of Building Materials.

I. FM (Factory Mutual Engineering Corp.) - Roof Assembly Classification.

J. LTTR - Long-Term Thermal Resistance, using techniques from CAN/ULC S770 based upon ASTM C1303.

1.3 SUBMITTALS

A. Product Data: Provide data on product characteristics, performance criteria and limitations.

1.4 REGULATORY REQUIREMENTS

A. Conform to FM requirements for roof assembly requirements.

B. Windstorm Rating: FM I-90.

1.5 DELIVERY, STORAGE, AND HANDLING

A. Deliver, store and protect products to site under provisions of Section 01 61 00.

B. Store products to protect from environment, clear of ground and moisture.

1.6 ENVIRONMENTAL REQUIREMENTS

A. Do not install insulation when temperature or weather conditions are detrimental to successful installation.

1.7 SEQUENCING

A. Sequence work under the provisions of Section 01 11 00.

B. Sequence work to ensure materials are in place before beginning the Work of this section.

1.8 COORDINATION

A. Coordinate work under provisions of Section 01 31 00.

B. Coordinate the work with Section 07 54 23 for installation of roofing materials.

2. PART 2 PRODUCTS

2.1 MANUFACTURERS - INSULATION MATERIALS

A. Atlas Roofing Products, www.atlasroofing.com.

B. Certainteed Corp., www.certainteed.com.

C. GAF Materials Corporation, www.gaf.com.

D. Hunter Panels, www.hunterpanels.com.

E. RMax Industries, www.rmaxinc.com

F. Johns Manville Corp., www.jm.com.

G. Substitutions: Under provisions of Section 01 25 13.

2.2 INSULATION MATERIALS

A. Rigid Polyisocyanurate Foam Roof Insulation Board: ASTM C1289, Type II, Grade 3 closed-cell HCFC Free "Green" polyisocyanurate foam core conforming to the following:

1. Board Density: ASTM D1622, 2.0 lb/cu ft.

2. Board Size: 48 x 48 inch.

3. Board Thickness: 2.5 inch, double layer.

4. Facing: Factory applied skin of fiberglass on both faces.

5. Thermal Resistance: LTTR, Aged R of 5.7/inch= 28.5.

6. Board Edges: Square.

7. Water Absorption: ASTM C209, less than 1 percent by volume maximum.

8. Flame/Smoke Properties: ASTM E84, 25/450.

9. Tapered Insulation Board: Tapered closed cell insulation of same characteristics as stated above for roof insulation. Minimum one inch in thickness, tapered to 1/2inch per foot slope.

B. Glass Matt Gypsum Protection Board for Roof Insulation: ASTM C1177, glass matt faced gypsum board both sides with non asphaltic heat cured coating one side, conforming to the following:

1. Board Material: Similar to DensDeck Prime as manufactured by G-P Gypsum Co., www.gp.com.

2. Board Thickness: 1/4 inch

3. Board Size: 48 x 96 inch or 48 x 48 inch

4. Board Edges: Square

5. Thermal Resistance: R value of 0.28

6. Flame/Smoke Properties: ASTM E84, 0/0..

2.3 TAPERED EDGE STRIPS/SADDLES/CRICKETTS

A. ASTM C728 fire resistant expanded perlite, configuration as detailed.

2.4 ACCESSORIES

A. Insulation Fasteners: Galvanized steel screws, plastic coated, with plastic washers, length and type to suit insulation thickness and substrate. Approved for application by Factory Mutual.

B. Roofing Adhesive: Single component polyurethane adhesive. Approved for application by Factory Mutual. Similar to Insta-Stik manufactured by The Dow Chemical Company, www.dow.com,

3. PART EXECUTION

3.1 EXAMINATION

A. Verify site conditions under provisions of Section 01 31 00.

B. Verify that substrate, adjacent materials, and insulation boards are dry and ready to be installed.

C. Verify substrate surface is flat, free of irregularities.

D. Verify that roof openings, curbs, pipes, sleeves, ducts, and vents through roof are solidly set.

E. Beginning of installation means installer accepts existing surfaces.

3.2 ROOF INSULATION INSTALLATION

A. Place insulation perpendicular to deck flutes with edges over flute surface for support.

B. Run insulation in straight lines, perpendicular to roof slope with end joints staggered between rows.

C. Lay insulation with edges in moderate contact without forcing.

D. Cut insulation neatly around penetrations through roof.

E. Cut and fit insulation tight to protrusions or interruptions to insulation plane.

F. Install separate layers of insulation with joints staggered and offset.

G. Place tapered insulation to required slope.

H. Trim insulation at roof drains to required slope to form a one inch deep sump area with a diameter of 4 feet.

I. Mechanically fasten base layer of insulation to deck with no less than one fastener for every two square feet of board area in compliance with spacing required by FM 1.29 for a Windstorm Resistance Classification.

J. Set each subsequent layer of insulation in continuous beads of adhesive applied by mechanical applicator as required by FM Windstorm Resistance Classification specified. Provide additional adhesive at edges of all roof penetrations.

3.3 PROTECTION BOARD INSTALLATION

A. Lay protection board over rigid insulation with joints staggered.

B. Install protection board in four continuous beads of roofing adhesive applied by mechanical applicator as required for FM Windstorm Resistance Classification. Provide additional adhesive at edges of all roof penetrations.

B. Trim surface of protection board where necessary at roof drains to conform to sump configuration and so completed surface is flush.

3.4 SADDLES, CRICKETT AND EDGE STRIP INSTALLATION

A. Install crickets and saddles, in roofing adhesive to configuration as indicated on drawings.

B. Install tapered edge strips, 1-1/2 inch thick x 24 inch wide, in roofing adhesive at all roof penetrations and at all intersections of roof with vertical surfaces.

END OF SECTION 07 22 00

SECTION 07 22 19 NAILABLE INSULATED SHEATHING

1. PART 1 GENERAL

1.1 SECTION INCLUDES

A. Vented nail base roof insulation.

B. Mechanical fasteners.

1.2 REFERENCES

A. ASTM C209 - Cellulosic Fiber Insulating Board.

B. ASTM C1289 - Standard Specification for Rigid Cellular Thermal Insulation Board.

C. ASTM C1303 - Standard Test Method for Estimating the Long Term Change in the Thermal Resistance of Unfaced Rigid Closed Cell Plastic Foam by Slicing and Scaling Under Controlled Laboratory Conditions.

D. ASTM D1622 - Apparent Density of Rigid Cellular Plastics.

E. ASTM E84 - Surface Burning Characteristics of Building Materials.

F. APA - The Engineered Wood Association.

G. FSC - Forest Stewardship Council.

H. FM - (Factory Mutual Engineering Corp) - Roof Assembly Classification.

I. LLTR- Long Term Thermal Resistance, using techniques from CAN/ULC S770 based upon ASTM C1303.

J. UL - (Underwriters Laboratories) - Fire Hazard Classifications.

1.3 SUBMITTALS

A. Submit product data under provisions of Section 01 33 00.

B. Submit product data for insulation and fasteners.

1.4 REGULATORY REQUIREMENT

A. Conform to applicable UL and FM requirements for roof assembly requirements.

B. Fire Hazard Classification: UL Class B.

C. Windstorm Rating: FM I-90.

1.5 DELIVERY, STORAGE, AND HANDLING

A. Deliver, store and protect products to site under provisions of Section 01 61 00.

B. Store products to protect from environment, clear of ground and moisture.

1.6 ENVIRONMENTAL REQUIREMENTS

A. Do not install insulation when temperature or weather conditions are detrimental to successful installation.

1.7 COORDINATION

A. Coordinate work under the provisions of Section 01 30 10.

B. Coordinate the work with Section 07 31 13 for installation of roofing materials.

2. PART 2 PRODUCTS

2.1 MANUFACTURERS

A. Apache Products Company, www.apacheproducts.com.

B. Atlas Roofing Products, www.atlasroofing.com.

C. Rmax Industries, www.rmaxinc.com.

D. Hunter Panels, www.hunterpanels.com.

E. Substitutions: Under provisions of Section 01 25 13.

2.2 MATERIALS

A. Nailable Insulated Sheathing: Foam core with nailable substrate; conforming to the following:

1. Foam Core: ASTM C1289, Type V, closed cell polyisocyanurate.

2. Foam Density: ASTM D1622, 2.0 lb/cu ft.

3. Foam Facing: Factory applied skin of fiberglass on both sides.

4. Board Facing: 7/16 inch thick APA rated OSB board one side.

5. Board Thickness: 5 inches.

6. Board Edges: Square.

7. Board Size: Nominal 48 x 96 inch.

8. Thermal Resistance: LLTR, aged R value of 32.

9. Water Absorption of Foam: ASTM C209, less than 1 percent by volume.

10. Ventilating Space: Minimum 1/2 inch thick space between foam core and board facing.

11. Flame/Smoke Properties of Foam: ASTM E84, 25/450.

2.3 ACCESSORIES

A. Insulation Fasteners: Galvanized steel screws, plastic coated, with steel, stress plates, length and type to suit insulation thickness and substrate. Approved for application by Factory Mutual.

3. PART 3 EXECUTION

3.1 EXAMINATION

A. Verify that substrate is ready to receive work.

B. Verify field measurements are as instructed by the manufacturer.

C. Verify that roof curbs, nailers, vents and other penetrating items are properly attached to substrate.

D. Beginning of installation means installer accepts existing substrate conditions.

3.2 INSTALLATION

A. Install in accordance with manufacturer's instructions.

B. Install sheathing with OSB side up.

C. Install sheathing with long dimension of board parallel to eave with end joints staggered.

D. Locate edges of sheathing over firm bearing.

E. Cut sheathing neatly around penetrations through roof.

F. Lay sheathing in moderate contact with adjacent boards allowing for a nominal 1/8 inch space.

G. Mechanically fasten sheathing in place in compliance with required FM wind storm rating.

3.3 PROTECTION

A. Protect finished installation under provisions of Section 01 61 00.

B. Protect work from damage prior to covering.

C. Install no more sheathing than can be adequately protected in the same day.

END OF SECTION 07 22 19

SECTION 07 27 26 FLUID-APPLIED MEMBRANE AIR BARRIERS

1. PART 1 GENERAL

1.1 SECTION INCLUDES

A. Fluid-applied, vapor permeable weather barrier membrane.

B. Joint Treatment:

1. Joint Tape.

2. Joint Compound.

C. Flashing:

1. Vapor Permeable Fluid-Applied Elastomeric Flashing.

2. Flexible Flashing.

3. Sheet Flashing.

D. Sealant.

E. Primers for flexible flashing and sheet flashing.

1.2 REFERENCES

A. ASTM C1250 - Standard Test Method for Nonvolatile Content of Cold Liquid-Applied Elastomeric Waterproofing Membranes.

B. ASTM C1305 - Standard Test Method for Crack Bridging Ability of Liquid-Applied Waterproofing Membrane.

C. ASTM D412 - Standard Test Methods for Vulcanized Rubber and Thermoplastic Elastomers - Tension.

D. ASTM D2240 - Standard Test Method for Rubber Property - Durometer Harness.

E. ASTM D4541 - Standard Test Method for Pull-Off Strength of Coatings Using Portable Adhesion Testers.

F. ASTM D7234 - Standard Test Method for Pull-Off Strength in Coatings on Concrete Using Portable Pull-Off Adhesion Testers.

G. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials.

H. ASTM E96 - Test Method for Water Vapor Transmission of Materials.

I. ASTM E331 - Standard Test Method for Water Penetration of Exterior Windows, Skylight, Doors and Curtain Walls by Uniform Static Air Pressure Differences.

J. ASTM E1105 - Standard Test Method for Field Determination of Water Penetration of Installed Exterior Windows, Skylights, Doors, and Curtain Walls, by Uniform or Cyclic Static Air Pressure Difference.

K. ASTM E1186 - Standard Practices for Air Leakage Site Detection in Building Envelopes and Air Barrier Systems.

L. ASTM E2178 - Standard Test Method for Air Permeance of Building Materials.

M. ASTM E 2357- Standard Test Method for Determining Air Leakage of Air Barrier Assemblies.

N. NFPA 285 - Standard Fire Test Method for Evaluation of Fire Propagation Characteristics of Exterior Non-Load-Bearing Wall Assemblies Containing Combustible Components.

1.3 DEFINITIONS

A. Air-Barrier Material: A primary element that provides a continuous barrier to the movement of air.

B. Air-Barrier Accessory: A transitional component of the air barrier that provides continuity.

C. Air-Barrier Assembly: The collection of air-barrier materials and accessories applied to an opaque wall, including joints and junctions to abutting construction, to control air movement through the wall.

1.4 SYSTEM DESCRIPTION

A. A single-component, synthetic polymer fluid-applied air-barrier system with elasticity and flexibility providing resistance to air flow, bulk water and wind driven rain yet will allow moisture vapor to escape.

B. All penetrations of the air-barrier system shall be made air and water tight.

1.5 PERFORMANCE REQUIREMENTS

A. Air Penetration Resistance of Material: 0.001 cfm/ft2 at 1.57 lbf/ft2, when tested in accordance with ASTM E2178.

B. Air Penetration Resistance of Assembly: $\leq$ 0.04 cfm/ft2 at 1.57 lbf/ft2, when tested in accordance with ASTM E2357.

C. Water Vapor Transmission: Not less than 20 perms, when tested in accordance with ASTM E96, Method B at 25 mils dry film thickness.

D. Water Penetration Resistance: No leakage at 12.5 psf when tested in accordance with ASTM E331.

E. Tensile Strength: Minimum 140 lbs/in^2, when tested in accordance with ASTM D412.

F. Estimated Elongation: 320 percent in accordance with ASTM D412.

G. Hardness: Passes at a Shore A hardness of 34, when tested in accordance with ASTM D2240.

H. Surface Burning Characteristics: Class A, when tested in accordance with ASTM E84. Flame Spread: 25, Smoke Developed: 25.

I. Fire Propagation Characteristics: Passes NFPA 285 testing as part of an approved assembly.

J. UV Resistance: 9 months.

K. Volatile Organic Content (VOC): Less than 2 percent (25-30 g/L) when measured in accordance with ASTM C1250.

L. Adhesion Strength: Minimum 25 psi or substrate failure to glass faced wallboard when tested according to ASTM D4541. Minimum 33 psi to concrete or masonry when tested according to ASTM D7234.

M. Low Temperature Crack Bridging: Pass, when tested in accordance with ASTM C1305.

N. Adhesives and sealants wet-applied on site shall meet VOC content requirements of the South Coast Air Quality Management District (SCAQMD) Rule #1168 and the requirements of the Bay Area Quality Management District Regulation 8, Rule 5.

O. Flashing systems shall comply with the VOC content requirements of the South Coast Air Quality Management District (SCAQMD) Rule #1168 and the requirements of the Bay Area Quality Management District Regulation 8, Rule 5.

1.6 SUBMITTALS

A. Submit shop drawings under provisions of Section 01 33 00.

B. Submit shop drawings indicating:

1. Locations and extent of air-barrier materials, accessories, and assemblies specific to project conditions.

2. Include details for substrate joints and cracks, counterflashing strips, penetrations, inside and outside corners, terminations, and tie-ins with adjoining construction.

3. Include details of interfaces with other materials that form part of air barrier.

C. Submit product data under provisions of Section 01 33 00.

D. Submit product data for each component of air-barrier assembly.

E. Submit samples under provisions of Section 01 33 00.

F. Submit two samples 6 x 6 inches in size illustrating fluid-applied membrane, flexible flashing and sheet flashing.

G. Submit test reports under provisions of Section 01 45 29.

H. Submit test report indicating compliance with requirements specified for ASTM E2178, E96 and E331.

I. Submit manufacturer's certificate under provisions of Section 01 33 00 that products meet or exceed specified requirements and are compatible with materials that connect to or that come in contact with the air-barrier assembly.

J. Submit manufacturer's installation instructions under provisions of Section 01 33 00.

1.7 QUALITY ASSURANCE

A. Quality Assurance: Under provisions of Section 01 43 00.

B. Installation shall be in accordance with manufacturer's installation guidelines and recommendations.

C. Maintain one copy of document on site.

D. Source Limitations: Provide weather barrier and accessory materials produced by single manufacturer.

1.8 QUALIFICATIONS

A. Manufacturer: Company specializing in the manufacture of products specified in this Section with minimum ten years documented experience.

B. Installer: Company specializing in applying the work of this Section with minimum five years documented experience and approved by manufacturer.

1.9 MOCKUP

A. Provide mockup of air-barrier assembly under provisions of Section 01 43 00.

B. Include membrane, flashing, joint and detailing compound and related accessories according to manufacturer's current printed instructions and recommendations.

C. Include typical wall openings and wall substrates.

D. Contact manufacturer's designated representative to perform required mock-up visual inspection and analysis as required for warranty.

E. When accepted, mockup will demonstrate minimum standard for the Work. Mockup may remain as part of the Work.

1.10 PRE-INSTALLATION CONFERENCE

A. Convene a conference two weeks prior to commencing work of this Section, under provisions of Section 01 31 00.

B. Require attendance of parties directly affecting the work of this Section.

C. Review all related project requirements and submittals, status of substrate work and preparation, areas of potential conflict and interface, availability of system materials and components, installer's training requirements, equipment, and coordinate methods, procedures and sequencing requirements for full and proper installation, integrations and protection.

1.11 DELIVERY, STORAGE, AND HANDLING

A. Deliver, store and protect products to site under provisions of Section 01 61 00.

B. Accept materials and components on-site in manufacturer's original unopened containers with identification labels intact. Verify damage.

C. Protect materials and components from freezing and extreme heat as recommended by manufacturer.

1.12 ENVIRONMENTAL REQUIREMENTS

A. Do not install materials and accessories when ambient conditions are not as recommended by manufacturer.

B. Do not apply materials to substrates that are damp, wet or during snow, rain, fog, or mist.

1.13 SEQUENCING AND SCHEDULING

A. Sequence work under provisions of Section 01 11 00.

B. Schedule work under provisions of Section 01 32 16.

C. Schedule work to avoid delays and minimize on-site storage.

D. Coordinate work under provisions of Section 01 31 00.

E. Coordinate with installation of windows, doors and louvers and flashings.

1.14 WARRANTY

A. Provide ten year warranty under provisions of Section 01 77 00.

B. Pre-installation meeting and observation of installation by manufacturer is required for warranty.

C. Include warranty coverage for the following items:

1. Materials and accessories shall be free from defects and shall meet physical properties and material specifications.

2. Material and accessories shall meet or exceed water and air holdout performance properties pursuant to specified testing requirements.

3. Materials and accessories will not disintegrate and will maintain their integrity over the life of the warranty.

2. PART 2 PRODUCTS

2.1 MANUFACTURERS

A. Basis of Design: DuPont Tyvek Fluid Applied WB + (Plus) System; Including Fluid Applied WB, Fluid Applied Flashing and Joint Compound. Fluid Applied Flashing - Brush Grade and Sealant for Tyvek Fluid Applied Systems. www.dupont.com.

B. Substitutions: Under provisions of Section 01 25 13.

2.2 MEMBRANE MATERIALS

A. Weather Barrier Membrane: Single component, low VOC, 25 mil thick synthetic polymer fluid applied flexible membrane. DuPont Tyvek Fluid Applied WB + (Plus) System.

2.3 ACCESSORIES

A. Joint Treatment:

1. Joint Tape:

(a) Product: Self-adhered fiberglass mesh tape as recommended by air-barrier manufacturer.

(b) Joint Compound: Fluid-applied, vapor permeable, elastomeric flashing material; trowel applied.

(1) Product: DuPont Tyvek Fluid Applied Flashing and Joint Compound.

B. Flashing:

1. Vapor permeable fluid-applied elastomeric flashing: DuPont Tyvek Fluid Applied Flashing and Joint Compound or DuPont Tyvek Fluid Applied Flashing - Brush Grade.

2. Flexible flashing with butyl adhesive layer: DuPont FlexWrap NF.

3. Sheet flashing with butyl adhesive layer: DuPont StraightFlash.

4. Sealant: Elastomeric; non-vapor permeable sealant; compatible with weather barrier, DuPont Sealant for Tyvek Fluid Applied Systems.

5. Primers for flexible flashing and sheet flashing: Manufacturer recomended primer to assist in adhesion between substrate and flashing.

3. PART 3 EXECUTION

3.1 EXAMINATION

A. Verify that substrate surfaces and openings are ready to receive work.

B. Verify field conditions are as instructed by the manufacturer.

C. Verify that required utilities are available, in proper locations, and ready for use.

D. Verify that substrates have cured and aged for the minimum time recommended by the manufacturer.

E. Beginning of installation means installer accepts existing substrate conditions.

3.2 PREPARATION

A. Remove grease, oil, bitumen, form-release agents, paints, curing compounds, and other penetrating contaminants or film-forming coats from concrete.

B. Remove fins, ridges, mortar, and other projections and fill honeycomb, aggregate pockets, holes, and other voids in concrete with substrate-patching material.

C. Substrate surface shall be clean and free of frost, oil, grease, mold and efflorescence.

D. Clean, prepare. treat, fill, and seal substrate and joints and cracks in substrate according to manufacturer’s written instructions and details.

E. Provide clean, dust-free, and dry substrate for air-barrier application.

F. Complete surface preparation, priming, flashing and detailing of openings, cracks, and material transitions prior to beginning installation of fluid-applied air-barrier assembly.

G. Mask off adjoining surfaces not covered by air barrier to prevent spillage and overspray affecting other construction.

H. At changes in substrate plane, apply sealant or termination compound beads at sharp corners and edges to form a smooth transition from one plane to another.

I. Cover gaps in substrate plane and form a smooth transition from one substrate plane to anther to provide continuous support for air barrier with manufacturer's recommended material.

J. Bridge isolation joints, expansion joints and discontinuous wall-to-wall, deck-to-wall, and deck-to-deck joints with air-barrier accessory material that accommodates joint movement according to manufacturer’s written instructions and details.

3.3 INSTALLATION DETAILING

A. Install in accordance with manufacturer's instructions and in compliance with Section 01 73 00.

B. Corners: Apply primer to outside and inside corners, extend 2 inches on each side of corner. Center sheet flashing over corner and press firmly in place.

C. Joint treatment:

1. Sheathing:

(a) Joints shall be prepared per manufacturer's approved joint treatment details.

(b) Apply joint tape as recommended by manufacturer.

(c) No joint treatment required for joints up to 1/16 inch.

(d) Joints 1/16 to 1/4 inch: Fluid-applied joint compound applied to form a 1 inch width on each side of sheathing joint; smooth joint compound across sheathing joint. Thickness shall be 15 to 25 mils.

(e) Joints 1/16 to 1/2 inch: Apply joint tape to bridge both sides of joint equally. Apply fluid-applied joint compound and trowel smooth embedding joint compound uniformly into joint tape to form a 1 inch width on each side of sheathing joint at a consistent thickness of 15 to 25 mils.

D. Apply fluid-applied joint compound to cladding anchors prior to installation of weather barrier membrane.

E. Apply fluid-applied joint compound around penetrations in exterior walls forming a fillet bead minimum ½ inch onto each surface.

F. Self-Adhered Flashing at Openings:

1. Prime substrate. Cut flexible flashing a minimum of 12 inches longer than length of sill rough opening.

2. Cover horizontal sill by aligning flexible flashing so that 2 inches will extend onto the face of the wall. Adhere to rough opening across sill and up jambs a minimum of 6 inches. Secure sheet membrane tightly into corners by working in along the sill before adhering up the jambs.

3. Fan flexible flashing at bottom corners onto face of wall. Firmly press in place.

4. Apply 9-inch wide strips of sheet flashing at jambs. Align sheet flashing so that 2 inches will extend onto the face of the wall. Start sheet flashing at head of opening and lap sheet membrane at sill.

5. Install flexible flashing at opening head using same installation procedures used at sill. Overlap jamb flashing a minimum of 2 inches.

6. Coordinate flashing with fluid-applied weather barrier and window installation.

G. Allow Fluid-Applied Flashing, Joint Compound and Sealant to cure for a minimum of 24 hours before coating with Fluid-applied Weather Barrier.

3.4 INSTALLATION - FLUID-APPLIED WEATHER BARRIER

A. Install fluid-applied weather barrier prior to installation of windows, doors, and louvers.

B. Mask and protect any adjacent finished surfaces from fluid-applied weather barrier material.

C. Install fluid-applied weather barrier over exterior face of required exterior wall substrates in accordance with manufacturer recommendations and instructions.

D. Install fluid-applied weather barrier by spray and backrolling method.

E. Provide a consistent and uniform thickness of a minimum of 25 mils applied in one coat.

F. Repair any voids, fish mouths or non-uniform installations or damage to proper mil thickness prior to installation of final cladding assemblies.

3.5 FIELD QUALITY CONTROL

A. Field inspection and testing will be performed under provisions of Section 01 45 29.

B. Testing Agency: Owner will engage a qualified testing agency to perform tests and inspections.

C. Inspections: Air-barrier materials, accessories, and installation are subject to inspection for compliance with requirements. Inspections will include the following:

1. Continuity of air-barrier system has been achieved throughout the building envelope with no gaps or holes.

2. Air-barrier dry film thickness.

3. Continuous structural support of air-barrier system has been provided.

4. Concrete surfaces are smooth, clean, and free of cavities, protrusions, and mortar droppings.

5. Site conditions for application temperature and dryness of substrates have been maintained.

6. Maximum exposure time of materials to UV deterioration has not been exceeded.

7. Surfaces have been primed.

8. Laps in strips and transition strips have complied with minimum requirements and have been shingled in the correct direction, with no fish mouths.

9. Termination compound has been applied on cut edges.

10. Strips and transition strips have been firmly adhered to substrate.

11. Compatible materials have been used.

12. Transitions at changes in direction and structural support at gaps have been provided.

13. Connections between assemblies (air-barrier and sealants) have complied with requirements for cleanliness, surface preparation and priming, structural support, integrity, and continuity of seal.

14. All penetrations have been sealed.

D. Tests: As performed by Owner's testing agency for the following tests:

1. Qualitative Air-Leakage Testing: Weather barrier assemblies will be tested for evidence of air leakage according to ASTM E1186 with smoke tracers.

2. Qualitative Water-Leakage Testing: Weather barrier assemblies will be tested for water leakage according to ASTM E1105. No water penetration shall occur.

E. Weather barriers assemblies will be considered defective upon failure of inspections and specific project testing required.

1. Remove and replace deficient weather barrier system components for retesting as specified above.

F. Repair damage to weather barriers caused by destructive testing; follow manufacturer's written instructions.

3.6 MANUFACTURER'S FIELD SERVICES

A. Notify weather barrier manufacturer's designated representative to obtain required periodic observations of weather barrier system installation.

3.7 PROTECTION

A. Protect finished installation under provisions of Section 01 61 00.

B. Protect weather barrier from contact with incompatible materials and sealants not approved per weather barrier manufacturer's recommendation.

C. Protect installed weather barrier system from damage during construction prior to cladding installation.

1. If damaged or exposed to UV beyond nine months, clean and prepare surfaces and install additional, full-thickness, fluid-applied weather barrier application in accordance with weather barrier manufacturer's instructions.

D. Remove masking materials and adjacent protection after weather barrier installation.

END OF SECTION 07 27 26

SECTION 07 31 13 ASPHALT SHINGLES

1. PART 1 GENERAL

1.1 SECTION INCLUDES

A. Asphalt shingle roofing.

B. Moisture shedding underlayment, eave, valley, and ridge protection.

1.2 REFERENCES

A. ASTM A653 - Steel Sheet, Zinc Coated, (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process.

B. ASTM A755 - Steel Sheet, Metallic Coated by the Hot-Dip Process and Prepainted by the Coil-Coating Process for Exterior Exposed Building Products.

C. ASTM A924 - General Requirements for Steel Sheet, Zinc-Coated (Galvanized) by the Hot-Dip Process.

D. ASTM B209 - Aluminum and Aluminum-Alloy Sheet and Plate.

E. ASTM D249 - Asphalt Roll Roofing Surfaced with Mineral Granules.

F. ASTM D3018 - Standard Specification for Class A Asphalt Shingles Surfaced with Mineral Granules.

G. ASTM D3161 - Standard Test Method for Wind-Resistance of Asphalt Shingles.

H. ASTM D3462 – Asphalt Shingles Made From Glass Felt and Surfaced with Mineral Granules.

I. ASTM D4586 - Asphalt Roof Cement, Asbestos Free.

J. NRCA - Roofing and Waterproofing Manual.

K. SMACNA - Architectural Sheet Metal Manual.

1.3 SUBMITTALS

A. Submit shop drawings, product data, and samples under provisions of Section 01 33 00.

B. Provide shop drawings indicating metal flashings, jointing methods, fastener types and spacing and installation details.

C. Provide product data indicating material characteristics, performance criteria and that materials meet specified standards.

D. Submit two samples of each shingle color indicating color range, finish texture and pattern.

E. Provide manufacturers instructions indicating materials installation requirements and procedures.

1.4 QUALITY ASSURANCE

A. Perform roofing in accordance with NRCA Steep Roofing Manual.

B. Perform flashing in accordance with SMACNA Architectural Sheet Metal Manual.

1.5 REGULATORY REQUIREMENTS

A. Conform to ASTM D3018 for class A fire resistance for shingle type specified.

B. Conform to ASTM D3161 for wind resistance rating when tested at a wind speed of 110 mph.

1.6 WARRANTY

A. Provide manufacturer's warranty for labor and materials for repair or replacement of defective shingles as necessary to maintain roof water tight and free of wind damage up to and including 110 mph.

B. Period of warranty to be for 30 years from date of substantial completion for water tightness and 5 years for wind damage.

2. PART 2 PRODUCTS

2.1 ASPHALT SHINGLE MANUFACTURERS

A. Atlas Roofing Corp.-Glassmaster, www.atlasroofing.com.

B. Certainteed, Independence, www.certainteed.com.

C. GAF Corporation - Timberline Ultra, www.gaf.com.

D. Georgia Pacific - Summit, www.gp.com.

E. Owens Corning - Weather Guard HP, www.owenscorning.com.

F. Substitutions: Under provisions of Section 01 25 13.

2.2 ROOFING MATERIALS

A. Asphalt Shingles: Mineral-surfaced, self sealing, laminated multi-ply overlay construction fiberglass based strip shingle complying with ASTM D3018, Type I, self-sealing, bearing Class A external fire exposure label, ASTM D3462, and meeting ASTM D3161 for wind resistance. Color as selected by Architect.

B. Hip and Ridge Shingles: Job-fabricated units cut from actual shingles used.

C. Roll Roofing: ASTM D249, Type I; Asphalt saturated roll roofing, 90 lb/square surfaced on weather side with mineral granules.

D. Underlayment: Spunbound reinforced polypropylene coated fabric sheet.

1. Premium Grade Feltex as manufactured by SystemComponents Corp., www.systemcomponents.net.

2. Premium Summit Synthetic Underlayment as manufactured by Atlas Roofing Corp., www.atlasroofing.com.

3. Roof Top Guard II Underlayment as manufactured by Underlayment Specialties Plus, www.uspunderlayment.com.

4. Substitutions: Under provisions of Section 01 25 13.

2.3 ACCESSORIES

A. Nails: Standard round wire shingle type of hot-dipped zinc-coated steel; minimum 7/16 inch head diameter and 11 gauge inch shank diameter of sufficient length to penetrate 3/4 inch through roof sheathing.

B. Plastic Cement: ASTM D4586, Type I.

2.4 FLASHING MATERIALS

A. Type as specified in Section 07 62 00.

B. Bituminous Paint: Acid and alkali resistant type; black color.

C. Nails: Standard round wire roofing type of hot-dipped zinc-coated steel; minimum 19/64 inch head diameter and 0.104 inch shank diameter; of sufficient length to penetrate through roof sheathing.

2.5 FLASHING FABRICATION

A. Form flashings to profiles indicated on Drawings, and to protect roof assembly and shed water.

B. Form sections square, true, and accurate to profile, in maximum possible lengths, free from distortion and other defects detrimental to appearance or performance.

C. Hem exposed edges of flashings minimum 1/4 inch on underside.

D. Apply bituminous paint on concealed surfaces of flashings.

3. PART 3 EXECUTION

3.1 INSTALLATION - GENERAL

A. Install asphalt shingle roofing over dry surfaces, free of ridges, warps, and voids.

B. Coordinate installation of roof mounted components or work projecting through roof. Verify roof openings are framed, sized, and located prior to installing work of this Section.

C. Completed installation to provide weathertight service.

3.2 EAVE PROTECTION INSTALLATION

A. Place metal eave edge flashing and gable edge flashing tight with fascia boards. Weather lap joints 2 inches and seal with plastic cement. Secure deck flange with nails spaced 8 to 10 inches.

B. Apply lap cement over eave edge flashing and embed an 18 inch wide underlayment starter strip flush with face of flashing. Secure in place. Lap ends 6 inches.

3.3 PROTECTIVE UNDERLAYMENT INSTALLATION

A. Install a 12 inch wide strip of underlayment over all seismic straps and plates.

B. Place one ply of underlayment weatherlapped minimum 6 inches at vertical ends and 4 inches at horizontal edges.

C. Stagger end laps of each consecutive layer. Nail protective underlayment to hold in place in accordance with manufacturer's recommendations.

D. Install protective underlayment perpendicular to slope of roof.

E. Weather lap and seal items projecting through or mounted on roof with plastic cement.

3.4 VALLEY PROTECTION INSTALLATION

A. Place one layer of metal flashing, minimum 24 inches wide, centered over valleys and crimped to guide water.

B. Weather lap joints minimum 4 inches.

C. Hem exposed edges and turn edge up.

D. Nail in place minimum 18 inches oc, 1 inch from edges.

3.5 FLASHING INSTALLATION

A. Installation to conform to requirements of Section 07 62 00.

B. Weather lap joints minimum 2 inches and seal weathertight with plastic cement.

C. Secure in place with nails at 12 inches oc. Conceal fastenings.

D. Flash and seal work projecting through or mounted on roofing with plastic cement. Provide weathertight installation.

3.6 ASPHALT SHINGLES INSTALLATION

A. Install starter strip of roll roofing or inverted shingles with tabs removed.

B. Fasten shingles in pattern, weather exposure and number of fasteners per shingle as recommended by manufacturer.

C. Comply with installation details and recommendation of shingle manufacturer and NRCA Steep Roofing Manual.

D. Project first course of shingles 3/4 inch beyond fascia board.

E. Extend shingles 1/2 inch beyond face of gable edge fascia board.

F. Cut shingles on slope of valleys to achieve uniform 4 inch exposure of metal valley flashing.

G. Cap hips and ridges with individual shingles, maintaining 5 inch weather exposure. Place to avoid exposed nails.

H. Coordinate installation of roof mounted components of work projecting through roof with weather tight placement of counter flashing.

END OF SECTION 07 31 13

SECTION 07 54 23 THERMOPLASTIC-POLYOLEFIN ROOFING

1. PART 1 GENERAL

1.1 SECTION INCLUDES

A. Single-ply thermoplastic membrane roofing.

B. Thermoplastic clad flashing metal.

C. Flexible membrane base flashings.

D. Roofing membrane expansion joints.

E. Counter flashings.

F. Walkway surface.

G. Adhesive and accessories.

1.2 REFERENCES

A. ASTM B370 – Standard Specification for Copper Sheet and Strip for Building Construction.

B. ASTM D412 - Standard Test Methods for Vulcanized Rubber and Thermoplastic Rubbers and Thermoplastic Elastomers -Tension.

C. ASTM D624 - Standard Test Method for Tear Strength of Conventional Vulcanized Rubber and Thermoplastic Elastomers.

D. ASTM D746 - Standard Test Method for Brittleness Temperature of Plastics and Elastomers by Impact.

E. ASTM D822 - Standard Practice for Conducting Tests on Paint and Related Coatings and Materials Using Filtered Open-Flame Carbon-Arc Exposure Apparatus.

F. ASTM D1004 - Standard Test Method for Initial Tear Resistance of Plastic Film and Sheeting.

G. ASTM D1079 – Standard Terminology Relating to Roofing, Waterproofing, and Bituminous Materials.

H. ASTM D6878 – Standard Specifications for Thermoplastic Polyolefin Based Sheet Roofing.

I. ASTM E96 - Standard Test Methods for Water Vapor Transmission of Materials.

J. ASTM E408 – Standard Test Methods for Total Normal Emittance of Surfaces Using Inspection-Meter Techniques.

K. ASTM E903 – Standard Test Method for Solar Absorptance, Reflectance, and Transmittance of Materials Using Integrating Spheres.

L. CBC – California Building Code, (CCR) California Code of Regulations, Title 24, Part 6.

M. CRRC - Cool Roof Rating Council - Product Rating Program CRRC-1.

N. FM - FM Global - FM 1-28 - Loss Prevention Data Sheet.

O. NRCA - National Roofing Contractors Association: The NRCA Roofing and Waterproofing Manual.

P. SMACNA – Sheet Metal and Air Conditioning Contractors National Association, Inc., Architectural Sheet Metal Manual.

Q. UL - Underwriters Laboratories Inc. - UL 790 - Tests for Fire Resistance of Roof Covering Materials.

1.3 DEFINITIONS

A. Roofing Terminology: ASTM D1079 and the glossary of the NRCA Roofing and Waterproofing Manual for definitions of roofing terms related to this section.

1.4 SYSTEM DESCRIPTION

A. Thermoplastic Sheet Membrane Conventional Roofing System: Single-ply membrane roofing system, fully adhered, with heat welded seams and white surface color finish.

1.5 PERFORMANCE REQUIREMENTS

A. Conform to UL and FM for roof assembly requirements.

B. UL 790: Class B Fire Hazard Classification.

C. Wind uplift requirement of 1-90, in accordance with FM Loss Prevention Data Sheet 1-28.

D. Provide an installed single-ply roofing membrane and base flashing system that does not permit the passage of water, and will withstand the wind uplift design pressures listed.

1.6 REGULATORY REQUIREMENTS

A. Conform to CBC - California Building Code, (CCR) California Code of Regulations, Title 24, Part 6 requirements for a Cool Roof under the Product Rating Program CRRC-1 of the Cool Roof Rating Council.

1.7 SUBMITTALS

A. Submit product data, samples and instructions under provisions of Section 01 33 00.

B. Product Data: Submit characteristics on membrane materials, adhesives, seaming materials, and flashing materials.

C. Manufacturer's Installation Instructions: Submit manufacturer's printed instructions for installation of roof membrane, flashing and accessories.

D. Applicator Qualifications: Submit manufacturer's written acceptance of applicator.

1.8 QUALITY ASSURANCE

A. Perform roofing Work in accordance with NRCA Roofing and Waterproofing Manual and roofing materials manufacturers printed guidelines.

B. Perform flashing Work in accordance with the SMACNA Architectural Sheet Metal Manual and roofing materials manufacturers printed guidelines.

C. Final Inspection: Roofing materials manufacturer representative shall provide a comprehensive final inspection after completion of the roofing system. Provide inspection report to the Architect.

1.9 QUALIFICATIONS

A. Manufacturer: Company specializing in manufacturing products specified in this section with minimum five years documented experience.

B. Applicator: Company specializing in performing Work of this section with minimum three years documented experience, factory trained and approved by manufacturer of roofing materials.

1.10 PRE-INSTALLATION MEETINGS

A. Convene a conference two weeks prior to commencing Work of this section under the provisions of Section 01 31 00.

B. Review preparation and installation procedures and coordinating and scheduling required with related Work.

1.11 DELIVERY, STORAGE, AND HANDLING

A. Deliver, store and protect product under the provisions of Section 01 61 00.

B. Deliver products in manufacturer's original containers, dry, undamaged, with seals and labels intact.

C. Store products in weather protected environment, clear of ground and moisture.

D. Store products in a manner to avoid significant or permanent deflection of roof deck.

1.12 ENVIRONMENTAL REQUIREMENT

A. Do not apply roofing membrane during inclement weather.

B. Do not apply roofing membrane to damp deck surface or when precipitation is expected or occurring.

C. Do not expose materials vulnerable to water or sun damage in quantities greater than can be weatherproofed during same day.

1.13 COORDINATION

A. Coordinate work under the provisions of Section 01 31 00.

B. Coordinate Work with installation of associated roof penetrations and metal flashings as Work of this section proceeds.

C. Notify roofing materials manufacturer 72 hours prior to commencing Work to arrange for inspection of roof application.

1.14 WARRANTY

A. Provide 10 year warranty under the provisions of Section 01 77 00.

B. Warranty: Manufacturer's No Dollar Limit Warranty covering roof membrane, base flashings and workmanship for the roofing and installation resulting from failure to resist penetration of moisture. Roofing abuse, natural causes or improper maintenance excluded. Warranty to include repair of roof membrane damage due to windstorms less than or equal to 64 mph.

C. Provide 2 year roofing installer's warranty under provisions of Section 01 77 00.

D. Roofing Installer's Warranty: Warranty shall cover Work of this section, including installation of all components of roofing system to include roofing membrane, base flashings, fasteners, coatings, sealants, and all penetrations of roofing membrane.

1.15 INSPECTION SERVICE

A. Manufacturer of the roofing materials shall provide the following services:

1. Application start-up inspection.

2. Periodic inspections during applications as required by manufacturer.

3. Final roofing inspection.

4. Certification of materials used and application.

2. PART 2 PRODUCTS

2.1 SINGLE PLY ROOFING - FULLY ADHERED

A. Johns Manville Corp., TPO-1 Adhered Roofing System, ASTM D6878, consisting of a single – ply SRT 60 roofing membrane, CRRC Product ID No. 0662-0001, UL No. R13772, www.jm.com.

B. Other acceptable manufacturers offering equivalent products:

1. Carlisle SynTec Systems, SureWeld TPO, CRRC Product ID No. 0628-0002, UL No. R8103, www.carlisle-syntec.com.

2. Firestone Building Products, Ultra Ply TPO, CRRC Product ID No. 0608-0008, UL No. R9516, www.firestonebpco.com.

3. GAF Materilas Corp., Everguard TPO, CRRC Product ID No. 0676-0001, UL No. R1306, www.gaf.com

4. Gen Flex Roofing Systems, Gen Flex TPO, CRRC Product ID No. 0632-0002, UL No. R9334, www.genflex.com.

5. TREMCO Inc., Tremply MAX TPO, CRRC Product ID No. 0612-0339, UL No. R6692, www.tremcoroofing.com.

C. Substitutions: Under provisions of Section 01 25 13.

2.2 COMPONENTS

A. Membrane: Smooth surface thermoplastic olefin (TPO) composite membrane; reinforced, 0.060 inch thick; white color; conforming to ASTM D6878 and the following criteria:

Properties	Test	Results
Elongation	ASTM D412	25 percent
Tear Strength	ASTM D751	130 lbf
Moisture Vapor Perms	ASTM E96	0.01 typical
Solar Reflectance (albedo X 100)	ASTM E903	0.70 min percent
Emissivity	ASTM E408	0.75 min percent

B. Membrane Adhesive: As recommended by membrane manufacturer. Shall meet South Coast Air Quality Management District (SCAQMD) Rule 1168.

C. Thinner and Cleaner: As recommended by adhesive manufacturer, compatible with sheet membrane.

D. Insulation: Rigid foam insulation as specified in Section 07 22 00.

E. Barrier Board: Glass matte gypsum protection board as specified in Section 07 22 00.

F. Inside and Outside Corners: Premolded corners, 4 inch x 4 inch flange, same material as membrane; white color.

G. Flexible Membrane Base Flashings: Same material as membrane; white color.

H. Flashing Metal: TPO clad 0.0239 inch thick galvanized sheet metal.

I. Counterflashings: Galvanized sheet metal, as specified in Section 07 62 00.

J. Prefabricated Control or Expansion Joint Flashing: TPO membrane over polypropylene foam backing rod sized 1.5 x joint width. Seamed to roof membrane.

2.3 ACCESSORIES

A. Tapered Edge Strips: As specified in Section 07 22 00.

B. Membrane Primer: Synthetic rubber based primer.

C. Roofing Nails and Screws: Galvanized or non-ferrous type, size as required to suit application with compatible plastic plates.

D. Sealants: As recommended by membrane manufacturer. Shall meet South Coast Air Quality Management District (SCAQMD) Rule 1168.

E. Sealing Mastic: One part, gun grade butyl sealant.

F. Strip Reglet Devices: Galvanized sheet metal as specified in Section 07 62 00.

G. Walkway Pads: TPO membrane with textured top surface finish, white color. 0.15 inch thick x 2'-6" wide x 50'-0" long.

H. Stack Boots: Prefabricated flexible molded TPO boot and collar for pipe stack penetrations through membrane with stainless steel clamping bands. 0.075 inch thick. Size to accommodate round and square tube.

I. Wood Nailers: Pressure treated wood nailers as specified in Section 06 10 00.

J. Copper Sheet: ASTM B370, Temper H00 of H01, cold-rolled copper sheet, 16 oz./sq. ft.

3. PART EXECUTION

3.1 EXAMINATION

A. Coordinate project conditions under the provisions of Section 01 31 00.

B. Verify surfaces and site conditions are ready to receive Work.

C. Verify deck is supported and secure.

D. Verify deck is clean and smooth, free of depressions, waves, or projections, properly sloped to drains and suitable for installation of roof system.

E. Verify deck surfaces are dry and free of snow or ice.

F. Verify that rigid insulation is butted tight together with no joints or gaps more than 1/4 inch wide.

G. Verify roof openings, curbs, pipes, sleeves, ducts, and vents through roof are solidly set, and wood nailing strips and reglets are in place.

H. Beginning of installation means applicator accepts existing conditions.

3.2 INSTALLATION

A. Membrane Application:

1. Roll out membrane and let relax for 30 minutes.

2. Apply adhesive to roof substrate at a rate of one gallon per 60 square feet of membrane.

3. Roll out membrane, free from air pockets, wrinkles, or tears. Firmly press sheet into place without stretching.

4. Roll membrane with weighted roller to ensure complete bonding between membrane and adhesive.

5. Bond sheet to substrate except those areas directly over control or expansion joint.

6. Overlap edges and ends a minimum of 3 inches.

7. Shingle joints of membrane on sloped substrate in direction of drainage.

8. Membrane laps shall be heat welded, continuous, without voids or partial welds. Minimum weld shall be 1-1/2 inches. Welds shall be free of scorch marks.

9. Seal all exposed edges permanently waterproof. Apply uniform bead of sealant to joint edge with TPO caulk.

10. Mechanically attach edge of membrane at junction of vertical surfaces and at edge of roof penetrations with fasteners spaced 12 inches on center.

11. Extend membrane onto vertical surfaces.

12. Seal membrane around roof penetrations.

13. All exposed sheet corners shall be rounded a minimum of 1 inch.

B. Flashings And Accessories:

1. Apply flexible flashings to seal roof membrane to vertical elements.

2. Apply adhesive to vertical surfaces at a rate of one gallon per 60 square feet of membrane.

3. Secure top of flashing membrane to nailing strips at 6 inches on center.

4. Overlap all adjacent flashing sheets by 3 inches.

5. Heat weld all vertical and horizontal seams in flashing membrane, 1-1/2 inch minimum.

6. Extend flashing membrane a minimum of 6 inches onto field roofing membrane.

7. Install prefabricated roofing control and expansion joints to isolate roof into areas as indicated on Drawings. Make joints watertight.

8. Coated metal flashings shall be formed in accordance with construction details and SMACNA guidelines.

9. Coordinate installation of roof drains and related flashings.

10. Install a 30 inch square copper flashing pan at roof drain mechanically attached at 12 inches on center. Seal membrane to flashing pan. Seal flashing pan to roof drain with sealing mastic.

11. Seal flashings and flanges of items penetrating membrane.

12. Seal pipe and tube penetrations with prefabricated flexible boots.

C. Walkway Pads:

1. Install walkway pads at roof access points, roof mounted equipment and related rooftop traffic pathways.

2. Install walkway pads with 2 inch wide joints to permit drainage.

3. Place pads in maximum lengths between field seams of membrane.

4. Heat weld seams at all edges.

5. Apply seam sealant at all welded edges.

3.3 FIELD QUALITY CONTROL

A. Require site attendance of roofing materials' manufacturers during installation of the Work at indicated intervals.

B. Test heat welds a minimum of 3 times per day.

C. Perform pull test on test strip to ensure full-width heat weld.

3.4 CLEANING

A. Section 01 77 00 - Execution Requirements: Final cleaning.

B. In areas where finished surfaces are soiled by Work of this section, consult manufacturer of surfaces for cleaning advice and conform to their documented instructions.

C. Repair or replace defaced or disfigured finishes caused by Work of this section.

D. Clean and restore all damaged surfaces to their original condition.

E. Dispose of all excess materials in a manner conforming to current EPA requirements.

F. Clean finished roof surface after completion. Ensure drainage ways and roof drains are clear and unobstructed.

3.5 PROTECTION OF INSTALLED CONSTRUCTION

A. Section 01 77 00 - Execution Requirements: Protecting installed construction.

B. Protect building surfaces against damage from roofing Work.

C. Where traffic must continue over finished roof membrane, protect surfaces.

END OF SECTION 07 54 23

SECTION 07 62 00 SHEET METAL FLASHING AND TRIM

1. PART 1 GENERAL

1.1 SECTION INCLUDES

A. Pre-coated, coping, parapet and cap flashings.

B. Fascias.

C. Counter flashing at piping penetrations, vent pipes, and conduits.

D. Counterflashings over bituminous base flashings.

E. Counterflashings at roof mounted equipment, curbs and supports.

F. Counterflashings for roof hatches and skylights.

1.2 REFERENCES

A. ANSI / SPRI ES-1 Wind Design Standard for Edge Systems Used with Low Slope Roofing Systems.

B. ASTM A653 - Steel Sheet, Zinc-Coated, (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process.

C. ASTM A755 - Steel Sheet, Metallic Coated by the Hot-Dip Process and Prepainted by the Coil-Coating Process for Exterior Exposed Building Products.

D. ASTM A792 – Steel Sheet, Aluminum-Zinc Alloy. Coated by the Hot-Dip Process, General Requirements.

E. ASTM A924 - General Requirements for Steel Sheet, Zinc-Coated (Galvanized) by the Hot-Dip Process.

F. ASTM B32 - Solder Metal.

G. ASTM B101 - Standard Specifications for Lead-Coated Copper Sheet and Strip for Building Construction.

H. ASTM D4586 - Asphalt Roof Cement, Asbestos Free.

I. SMACNA - Architectural Sheet Metal Manual.

1.3 SYSTEM DESCRIPTION

A. Work of this Section is to physically protect membrane roofing , asphalt shingles roofing and base flashings, from damage that would permit water leakage to building interior.

1.4 QUALITY ASSURANCE

A. Applicator: Company specializing in sheet metal flashing work with five years minimum experience.

B. Perform work in accordance with SMACNA standard details and requirements.

C. Copings and roof edge flashings shall conform to SPRI ES-1 testing and shall be in compliance with SMACNA Technical Resource Bulletin #5-09.

D. SPRI Wind Design Standard: Manufacture and install copings and roof edge flashings capable of resisting an ultimate design wind speed of 115 miles per hour.

1.5 SUBMITTALS

A. Submit shop drawings, product data, and samples under provisions of Section 01 33 00.

B. Submit shop drawings of sheet metal items indicating profiles, jointing, terminations and installation details. Indicate type and spacing of fasteners.

C. Submittal of specific plates from the SMACNA Architectural Sheet Metal Manual constitutes acceptable documentation of installation details.

D. Submit product data for pre-coated galvanized steel.

E. Submit product data for flashing accessories.

F. Submit warranty for water tightness.

G. Submit warranty for metal finish.

1.6 STORAGE AND HANDLING

A. Store products under provisions of Section 01 61 00.

B. Stack preformed material to prevent twisting, bending, or abrasion, and to provide ventilation.

C. Prevent contact with materials during storage which may cause discoloration, staining, or damage.

1.7 WARRANTY

A. Provide warranty under provisions of Section 01 77 00.

B. Provide 2-year warranty coverage for degradation of water tightness and integrity of seals.

C. Provide 20-year warranty coverage for metal finish from all defects.

2. PART 2 PRODUCTS

2.1 SHEET MATERIALS

A. Pre-Coated Galvanized Steel: ASTM A755 on zinc-coated galvanized substrate, ASTM A653, Grade 33, G90 zinc coating in accordance with ASTM A924 or ASTM A792, Grade 50, AZ55 aluminum zinc coating; 0.0299 inch thick core steel.

2.2 ACCESSORIES

A. Lead-Coated Copper: ASTM B101, Temper H00 and H01, cold-rolled copper sheet, coated both sides with lead weighing not less than 12 lb/100 sq. ft. or more than 15 lb./100 sq. ft. total weight of copper sheet with lead applied to both sides.

B. Fastener: Galvanized steel or stainless steel with soft neoprene washers at exposed fasteners.

C. Underlayment: Spunbound reinforced polypropylene coated fabric sheet.

1. Premium Grade Feltex as manufactured by SystemComponents Corp., www.systemcomponents.net.

2. Premium Summit Synthetic Underlayment as manufactured by Atlas Roofing Corp., www.atlasroofing.com.

3. Roof Top Guard II Underlayment as manufactured by Underlayment Specialties Plus, www.uspunderlayment.com.

4. Substitutions: Under provisions of Section 01 25 13.

D. Slip Sheet: 0.05 lb./sq. ft., rosin sized building paper.

E. Sealant: Type specified in Section 07 92 00.

F. Bedding Compound: Rubber-asphalt type.

G. Plastic Cement: ASTM D4586, Type I.

H. Metal Flashing System: Two piece pre-coated galvanized steel similar to Springlok Flashing System, manufactured by Fry Reglet, www.fryreglet.com, type as indicated. Include fabricated end closures and mitered corners.

I. Solder for Lead-Coated Copper: ASTM B32, Grade SN 60 percent tin, 40 percent lead.

2.3 FABRICATION

A. Form sections true to shape, accurate in size, square, and free from distortion or defects.

B. Fabricate concealed cleats of galvanized steel, ASTM A653, Grade 33, G90 zinc coating, 0.0478 inch thickness, interlockable with sheet.

C. Fabricate exposed cleats and coverplates of same material as sheet, interlockable with sheet.

D. Form pieces in longest practical lengths.

E. Hem exposed edges on underside 1/2 inch. Miter and seam corners.

F. Form material with flat lock seam.

G. Solder and seal metal joints. After soldering, remove flux. Wipe and wash solder joints clean.

H. Fabricate corners from one piece with minimum 18 inch long legs; seam for rigidity, seal with sealant.

I. Fabricate vertical faces with bottom edge formed outward 1/4 inch and hemmed to form drip.

J. Fabricate flashings to allow toe to extend 2 inches over roofing surface. Return and brake edges.

K. Fabricate vent pipe and roof penetration flashings of lead-coated copper with clamping ring.

2.4 FINISH

A. Kynar 500 or Hylar 5000 shop pre-coated finish with 0.2 mil baked on primer and 0.8 mil baked on topcoat for a 1.0 mil dry film thickness. Color to be selected by Architect from manufacturer's entire range of colors.

3. PART 3 EXECUTION

3.1 INSPECTION

A. Verify roof openings, curbs, pipes, sleeves, ducts, or vents through roof are solidly set, cant strips and reglets are in place, and nailing strips located.

B. Verify membrane termination and base flashings are in place, sealed, and secure.

C. Beginning of installation means acceptance of existing conditions.

3.2 PREPARATION

A. Field measure site conditions prior to fabricating work.

B. Install starter and edge strips, and cleats before starting installation.

C. Install surface mounted reglets true to line and level. Seal top with sealant.

D. Install underlayment with protective slip sheet over parapets, caps, copings, gravel stops and curbs.

3.3 INSTALLATION

A. Conform to indicated details on the drawings and the recommendations included in the SMACNA Architectural Sheet Metal Manual.

B. Provide for thermal expansion of exposed sheet metal work. Space movement joints at 10 feet - 0 inches o.c. maximum with no joints within 2 feet - 0 inches of corners.

C. Form expansion joints of intermeshing hooked flanges filled with sealant.

D. Insert flashings into reglets to form tight fit. Secure in place with lead wedges at maximum 12 inches on center. Pack remaining spaces with lead wool. Seal flashings into reglets with sealant.

E. Secure flashings in place using concealed fasteners. Use exposed fasteners only where indicated.

F. Lap, lock, seam and seal all joints.

G. Apply plastic cement compound between metal flashings and felt flashings. Apply bituminous coating between dissimilar metals where occurs.

H. Fit flashings tight in place. Make corners square, surfaces true and straight in planes, and lines accurate to profiles.

I. Roof-Penetration, Vent Pipe Flashing: Turn lead flashing down inside vent piping. Clamp flashing to other pipes penetrating roof except for vent piping. Seal with elastomeric sealant.

J. Seal metal joints watertight.

3.4 FIELD QUALITY CONTROL

A. Conform to SMACNA Architectural Sheet Metal Manual.

B. Field observation will involve surveillance of Work during installation to ascertain compliance with specified requirements.

END OF SECTION 07 62 00

SECTION 07 71 23 MANUFACTURED GUTTERS AND DOWNSPOUTS

1. PART 1 GENERAL

1.1 SECTION INCLUDES

A. Galvanized steel gutters.

B. Steel pipe downspouts.

C. Precast concrete splash blocks and sheet metal splash pans.

1.2 REFERENCES

A. ASTM A53 - Pipe, Steel, Black and Hot-Dipped Zinc-Coated Welded and Seamless.

B. ASTM A123 - Zinc (Hot-Dip Galvanized) Coating on Iron and Steel Products.

C. ASTM A653 - Steel Sheet, Zinc Coated, (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process.

D. ASTM A755 - Steel Sheet, Metallic Coated by the Hot-Dip Process and Prepainted by the Coil-Coating Process for Exterior Exposed Building Products.

E. ASTM A792 - Steel Sheet, Aluminum-Zinc Alloy. Coated by the Hot-Dip Process, General Requirements.

F. ASTM A924 - General Requirements for Steel Sheet, Zinc-Coated (Galvanized) by the Hot-Dip Process.

G. SMACNA - Architectural Sheet Metal Manual.

1.3 SUBMITTALS

A. Submit shop drawings, product data, and samples under provisions of Section 01 33 00.

B. Submit shop drawings of metal items indicating profiles, jointing, terminations, and installation details. Indicate type and spacing of fasteners.

C. Submittal of specific plates from the SMACNA Architectural Sheet Metal Manual constitutes acceptable documentation of installation details.

D. Submit product data for pre-coated galvanized steel.

E. Submit two samples 4 x 4 inch in size illustrating metal finish color for pre-coated steel.

F. Submit warranty for metal finish.

1.4 QUALITY ASSURANCE

A. Applicator: Company specializing in sheet metal work with five years minimum experience.

B. Perform work in accordance with SMACNA standard details and requirements.

1.5 STORAGE AND HANDLING

A. Store products under provisions of Section 01 61 00.

B. Stack preformed material to prevent twisting, bending, or abrasion and to provide ventilation.

C. Prevent contact with materials during storage which may cause discoloration, staining or damage.

1.6 WARRANTY

A. Provide warranty under provisions of Section 01 77 00.

B. Provide 20-year warranty coverage for metal finish from all defects.

2. PART 2 PRODUCTS

2.1 MATERIALS

A. Galvanized Steel: ASTM A653, Grade 33, G90 zinc-coating in accordance with ASTM A924; thickness as specified.

B. Pre-coated Galvanized Steel: ASTM A755 on zinc-coated galvanized substrate, ASTM A653, Grade 33, G90 zinc coating in accordance with ASTM A924, or ASTM A792, Grade 50, AZ55 aluminum zinc coating. thickness as specified.

2.2 COMPONENTS

A. Gutters : 0.0299 inch thick.

B. Downspouts: ASTM A53, Grade B, Schedule 40 steel pipe, standard weight, Type S, one piece without joints, galvanized according to ASTM A53; 1.8 oz./sq. ft.

C. Splash Blocks: Precast concrete type, of sizes and profiles indicated; minimum 3000 psi at 28 days, with minimum 5 percent air entrainment.

D. Splash Pans: Same metal as for gutters.

2.3 ACCESSORIES

A. Anchorage Devices: Meet SMACNA requirements.

B. End Caps, Downspout Outlets and Strainers, Rain Diverters, Straps, Support Brackets, Joint Fasteners. Profiled to suit gutters and downspouts.

C. Sealant: Silicone type as specified in Section 07 92 00.

2.4 FABRICATION

A. Form gutters and downspouts of profiles and sizes indicated.

B. Field measure site conditions prior to fabricating work.

C. Fabricate with required connection pieces.

D. Form sections square, true, and accurate in size, in maximum possible lengths and free of distortion or defects detrimental to appearance or performance.

E. Hem exposed edges of metal.

F. Seal metal joints.

G. Fabricate gutter and downspout accessories; seal watertight.

H. Form splash pans to size as detailed with rolled edges.

2.5 FINISHING

A. Kynar 500 or Hylar 5000 shop pre-coated finish on flat sheet metal stock. Finish with 0.2 mil baked on primer and 0.80 mil baked on topcoat for a 1.0 mil dry film thickness. Color to be selected by Architect from manufacturer's entire range of standard colors.

B. Galvanize assembled steel pipe downspouts after fabrication to minimum 1.25/oz sq ft zinc coating in accordance with ASTM A123.

3. PART 3 EXECUTION

3.1 EXAMINATION

A. Verify that surfaces are ready to receive work.

B. Beginning of installation means acceptance of existing conditions.

3.2 INSTALLATION

A. Install gutters, downspouts, and accessories in accordance with SMACNA requirements.

B. Join lengths with seams sealed watertight. Flash and seal gutters to downspouts and accessories.

C. Seal metal joints watertight.

D. Set splash blocks and pans under downspouts.

END OF SECTION 07 71 23

SECTION 07 72 33 ROOF HATCHES

1. PART 1 GENERAL

1.1 SECTION INCLUDES

A. Prefabricated roof hatches with integral support curbs, operable hardware, and counterflashings.

B. Roof hatch railing system.

1.2 REFERENCES

A. UL - Underwriters' Laboratories: Fire Hazard Classification.

B. FM - FM Global: Roof Assembly Classifications.

C. OSHA - Standards of Occupational Safety and Health Administration.

1.3 SUBMITTALS

A. Submit product data under provisions of Section 01 33 00.

B. Provide data on unit construction, sizes, configuration, jointing methods, attachment methods, operation and accessories.

C. Manufacturer and/or fabricator shall submit a certificate of product compliance with OSHA Standards.

1.4 REGULATORY REQUIREMENTS

A. OSHA regulations as applicable to roof access hatches, 29 CFR 1910.23.

2. PART 2 PRODUCTS

2.1 ACCEPTABLE MANUFACTURERS

A. Babcock-Davis Hatchways, Inc., www.babcockdavis.com.

B. Bilco Co., www.bilco.com.

C. Milcor, Inc., www.milcorinc.com.

D. Nystrom Building Products, www.nystrom.com.

E. Precision Ladders, LLC, www.precisionladders.com.

F. Substitutions: Under provisions of Section 01 25 13.

2.2 ROOF HATCHES

A. Unit:2'-6" x 3'-0" size, single leaf type.

B. Curb: 0.090 inch thick aluminum curb with one inch rigid insulation; integral cap flashing to receive roof flashing system; extended flange for mounting. Fabricate curbs to maintain a minimum 12 inches above roofing surface.

C. Cover: 0.090 inch thick aluminum cover with 1 inch rigid insulation retained by inner liner. Continuous gasket to provide weatherproof seal.

D. Hardware: Manufacturer's standard manually operated type with compression spring operators, positive snap latch with turn handles inside and out and padlock hasp inside; automatic hold-open arm with vinyl covered grip handle for easy release; galvanized finish.

E. Hinges: Manufacturer's recommended type.

2.3 RAILING SYSTEM

A. Hatch manufacturer’s pipe rail safety rail system that meets the requirements of OSHA 1910.23.

B. Hatch Access Protection: Self-latching hinged gate.

C. Substitutions: Under provisions of Section 01 25 13.

2.4 HATCH FABRICATION

A. Fabricate free of visual distortions and defects. Weld corners and joints.

B. Provide for removal of condensation.

C. Provide weathertight assembly.

2.5 FINISH

A. Shop prime paint all exposed metal.

B. Site paint metal surfaces under provisions of Section 09 90 00.

3. PART 3 EXECUTION

3.1 INSTALLATION

A. Install in accordance with manufacturer's instructions. Coordinate with installation of roofing system and related flashings. Provide weather tight installation.

B. Permanently bolt railing system to roof hatch curb in accordance with manufacturer's instructions.

C. Apply bituminous paint on metal surfaces of units in contact with cementitious materials and dissimilar metals.

3.2 ADJUSTING

A. Adjust hinges for smooth operation.

B. Adjust latching mechanisms for positive engagement.

END OF SECTION 07 72 33

SECTION 07 84 00 FIRESTOPPING

1. PART 1 GENERAL

1.1 SECTION INCLUDES

A. Penetrations through fire-resistance-rated floor and roof construction including both empty openings and openings containing cables, pipes, ducts, conduits, and other penetrating items.

B. Penetrations through fire-resistance-rated walls and partitions including both empty openings and openings containing cables, pipes, ducts, conduits, and other penetrating items.

C. Penetrations through smoke barriers and construction enclosing compartmentalized areas involving both empty openings and openings containing penetrating items.

D. Sealant joints in fire-resistance-rated construction.

E. Fireproof firestopping and firesafing materials and accessories.

1.2 REFERENCES

A. ASTM C920 - Elastomeric Joint Sealants.

B. ASTM C1193 - Use of Joint Sealants.

C. ASTM E84 - Test Method for Surface Burning Characteristics of Building Materials.

D. ASTM E119 - Method for Fire Tests of Building Construction and Materials.

E. UL - Fire Hazard Classifications.

F. UL 1479 - Fire Tests of Through-Penetration Firestops.

G. 40 CFR Part 763, Subpart F (7-1-90 Edition) - Asbestos Hazardous Emergency Response Act, Friable Asbestos - Containing Materials in Schools.

1.3 DEFINITION

A. Firestopping (Firesafing): A sealing or stuffing material or assembly placed in spaces between building materials to arrest the movement of smoke, heat, gases, or fire through wall or floor openings.

1.4 SYSTEM DESCRIPTION

A. F-Rated Through Penetration Firestop Systems: F-ratings as required according to UL 1479, but not less than that equaling or exceeding fire resistance rating of assembly penetrated where the following conditions exist:

1. Penetrations larger than 4 inch nominal pipe size or 16 square inches in overall cross-sectional area.

B. T-Rated Through Penetration Firestop Systems: T-ratings, in addition to F-ratings, as required according to UL 1479, where the following conditions exist:

1. Through penetrations of fire rated walls above corridor ceilings which are not part of a fire-resistive assembly.

2. Through penetrations of fire rated walls below any ceiling.

3. Penetrations larger than 4 inch nominal pipe size or 16 square inches in overall cross-sectional area.

C. Penetrations not larger than 4 inch nominal pipe size or 16 square inches in overall cross-sectional area shall have the annular space between the penetrating item and the wall/floor assembly filled with a material which will prevent passage of flame and hot gases sufficient to ignite cotton waste when subjected to ASTM E119 under a minimum positive pressure differential of 0.01 inch water column for the time period at least equal to the fire resistance rating of the wall/floor assembly.

D. Surface Burning: ASTM E84 with a flame spread/smoke developed rating of 25/450.

E. Firestop all interruptions and terminations of fire rated assemblies.

F. For piping penetrations for plumbing and wet-pipe sprinkler systems, provide moisture-resistant through-penetration firestop systems.

G. For floor penetrations with annular spaces exceeding 4 inches or more in width and exposed to possible loading and traffic, provide firestop systems capable of supporting the floor loads involved either by installing floor plates or by other means.

H. For penetrations involving insulated piping, provide through-penetration firestop systems not requiring removal of insulation.

1.5 SUBMITTALS

A. Submit under provisions of Section 01 33 00.

B. Product Data: Provide data on product characteristics, performance and limitation criteria.

C. Manufacturer's Installation Instructions: Indicate preparation and installation instructions.

D. Certification: Submit firestopping manufacturer's certificate that products supplied comply with local regulations controlling use of volatile organic compounds (VOCs) and are nontoxic to building occupants.

1.6 QUALITY ASSURANCE

A. Through penetration firestop systems to correspond to those penetration firestop system designations listed by UL in their Fire Resistance Directory.

1.7 REGULATORY REQUIREMENTS

A. Conform to CBC, California Building Code, (CCR) California Code of Regulations, Title 24, Part 2 and UL requirements for fire resistance ratings and surface burning characteristics.

B. Firestopping products shall contain no detectable asbestos as determined by 40 CFR, Part 763, Subpart F, Appendix A, Section 1, Polarized Light Microscopy.

1.8 SEQUENCING AND SCHEDULING

A. Coordinate Work under provisions of Section 01 31 00.

B. Coordinate construction of openings and penetrating items to ensure that through penetration firestop systems are installed per manufacturer's instructions and regulatory requirements.

C. Do not cover up installations that will become concealed behind other construction until authorities having jurisdiction, if required, have examined each installation.

1.9 ENVIRONMENTAL REQUIREMENTS

A. Do not apply materials when temperature of substrate material and ambient air is below 60 degrees F.

B. Maintain this minimum temperature before, during, and for 3 days after installation of materials.

C. Provide ventilation in areas to receive solvent cured materials.

2. PART 2 PRODUCTS

2.1 FIRESTOPPING, GENERAL

A. Provide firestopping components that are compatible with each other, substrates of openings, and items penetrating firestopping.

B. Provide accessories for each firestopping system that are needed to comply with designated fire-resistance-rated systems specified by firestopping manufacturer.

2.2 ACCEPTABLE MANUFACTURERS

A. AD Fire Protection Systems, Inc., www.adfire.com.

B. Hilti Construction Chemicals, Inc., www.us.hilti.com.

C. Minnesota Mining and Mfg. Co., www.3m.com/firestop.

D. Rector Seal Corporation, www.rectorseal.com.

E. Specified Technologies, Inc., www.stifirestop.com.

F. Tremco, www.tremcosealants.com.

G. United States Gypsum Co., www.usg.com.

H. Substitutions: Under provisions of Section 01 25 13.

2.3 FILL MATERIALS

A. Intumescent Wrap: Single-component, elastomeric sheet.

B. Vinyl Compound: Vinyl-based powder product mixed on site with water to produce a paintable compound with flame-spread and smoke-developed rating of 0 per ASTM E84.

C. Silicone Foam: Two-component, silicone based liquid elastomer that, when mixed, expands and cures in place to produce a flexible nonshrinking foam.

D. Silicone Sealant: Moisture-curing, single-component, silicone-based, neutral-curing elastomeric sealant either in a self-leveling or non-sag grade for opening condition.

E. Fiber Stuffing: Mineral fiber stuffing with a minimum density of 3.5 lbs./cu. ft.

2.4 JOINT SEALANTS

A. Manufacturer's standard chemically curing elastomeric sealant that complies with ASTM C920.

B. Provide selections from manufacturer's full range of colors.

C. Single-Component, Neutral Curing Silicone Sealant: Type S; Grade NS; Class 25; exposure-related use NT; and joint substrate related uses M, G, A, and O, as applicable to substrate assembly condition.

3. PART 3 EXECUTION

3.1 EXAMINATION

A. Verify site conditions under provisions of Section 01 31 00.

B. Verify openings are ready to receive the work of this Section.

3.2 PREPARATION

A. Clean substrate surfaces of dirt, dust, grease, oil, loose material, or other matter which may affect bond of firestopping material.

B. Remove laitance and form release agents from concrete.

C. Remove incompatible materials which may affect bond.

D. Install backing materials to arrest liquid material leakage.

3.3 APPLICATION OF THROUGH-PENETRATION FIRESTOPS

A. Install material at walls or partition openings which contain penetrating sleeves, piping, ductwork, conduit and other items, requiring firestopping.

B. Comply with through-penetration firestop manufacturer's installation instructions and drawings pertaining to products and applications required.

C. Install forming materials and other accessories of types required to support fill materials during their application and in the position needed to produce shapes and depths required to achieve fire ratings.

D. After installing fill materials, remove combustible forming materials and other accessories not indicated as permanent components of firestop system.

E. Apply primer and materials in accordance with manufacturer's instructions.

F. Apply firestopping material in sufficient thickness to achieve rating.

3.4 APPLICATION OF FIRE-RESISTIVE JOINT SEALANT

A. Comply with ASTM C1193 and manufacturer's installation instructions and drawings pertaining to products and applications required.

B. Install joint fillers to provide support and at a position required to produce depth to joint widths that allow development of fire-resistance rating required.

C. Install sealant to completely fill recesses provided. Install sealant at same time as joint filler.

D. Tool non-sag sealants after application to form smooth uniform bead to configuration required to produce fire-resistance rating.

3.5 FIELD QUALITY CONTROL

A. Do not cover up installations that will become concealed behind other construction until authorities having jurisdiction if required has examined each installation.

B. Where deficiencies are found, repair or replace firestopping to required condition.

3.6 CLEANING

A. Clean Work under provisions of Section 01 77 00.

B. Clean adjacent surfaces of firestopping materials.

3.7 PROTECTION OF FINISHED WORK

A. Protect finished Work under provisions of Section 01 61 00.

B. Protect adjacent surfaces from damage by material installation.

END OF SECTION 07 84 00

SECTION 07 92 00 JOINT SEALANTS

1. PART 1 GENERAL

1.1 SECTION INCLUDES

A. Preparing sealant substrate surfaces.

B. Sealant and backing.

1.2 SUMMARY OF SEALANT LOCATIONS

A. Joints in horizontal surfaces.

1. Expansion and isolation joints in cast-in-place concrete slabs.

2. Control joints, dents, and cracks larger than (1/16") in polished concrete floors.Sealant to be custom color matching adjacent surface and approved by the Owner.

3. Joints in precast concrete paving units.

4. Control and expansion joints in ceramic tile.

5. Control and expansion joints in soffits, ceilings and overhead surfaces.

6. Perimeter joints in exterior openings.

7. Joints between ceiling surfaces and frames for doors and windows.

8. Joints in flashing and sheet metal.

9. Perimeter joints of plumbing fixtures.

10. Acoustical isolation joints between head and sill of walls and floor and ceiling surfaces.

11. Joints between countertops and wall surfaces.

12. Joints in skylights and framing.

13. Joints between thresholds and floors.

14. Joints between dissimilar materials and those listed above.

15. Other joints as indicated.

B. Joints in vertical surfaces:

1. Expansion and isolation joints in cast-in-place concrete.

2. Expansion and isolation joints in masonry.

3. Joints in precast concrete.

4. Expansion and isolation joints in stonework.

5. Control and expansion joints in ceramic tile.

6. Perimeter joints in exterior openings.

7. Joints in flashing and sheet metal.

8. Perimeter joints of plumbing fixtures.

9. Acoustical isolation joints of walls.

10. Joints between cabinets and walls.

11. Joints between wall surfaces and door and window frames.

12. Joints in skylights and framing.

13. Isolation joints in plaster walls.

14. Joints between dissimilar materials and those listed above.

15. Other joints as indicated.

1.3 REFERENCES

A. ASTM C834 - Latex Sealing Compounds.

B. ASTM C919 - Practices for Use of Sealants in Acoustical Applications.

C. ASTM C920 - Elastomeric Joint Sealants.

D. ASTM C1193 - Standard Guide for Use of Joint Sealants.

E. ASTM D1056 - Flexible Cellular Materials - Sponge or Expanded Rubber.

F. FS TT-S-001657 - Sealing Compound, Single Component, Butyl Rubber Based, Solvent Release Type.

G. SWRI - (Sealant, Waterproofing and Restoration Institute) - Sealant and Caulking Guide Specification.

1.4 SUBMITTALS

A. Submit product data under provisions of Section 01 33 00.

B. Submit product data indicating sealant chemical characteristics, performance criteria, limitations, and color availability.

C. Submit samples under provisions of Section 01 33 00.

D. Submit two samples 4 inches long in size illustrating colors selected.

1.5 QUALITY ASSURANCE

A. Manufacturer: Company specializing in manufacturing the products specified in this Section with minimum five years documented experience.

B. Applicator: Company specializing in applying the Work of this Section with minimum three years documented experience, approved by sealant manufacturer.

C. Conform to Sealant, Waterproofing, and Restoration Institute (SWRI) requirements for materials and installation.

D. Perform Work in accordance with ASTM C1193.

E. Perform acoustical sealant application work to provide maximum STC values in accordance with ASTM C919.

1.6 ENVIRONMENTAL REQUIREMENTS

A. Do not install solvent curing sealants in enclosed building spaces.

B. Do not install sealant when temperature is less than 40 degrees F.

C. Maintain temperature and humidity recommended by the sealant manufacturer during and after installation.

1.7 OPERATION AND MAINTENANCE DATA

A. Submit maintenance data under the provisions of Section 01 77 00.

B. Submit recommended inspection intervals for sealant joints.

C. Submit instructions for repairing and replacing failed sealant joints.

1.8 WARRANTY

A. Provide 5 year warranty under provisions of Section 01 77 00.

B. Include coverage for installed sealants and accessories which fail to achieve air and water seal and exhibit loss of adhesion or cohesion or do not cure.

2. PART 2 PRODUCTS

2.1 MATERIALS

A. Compatibility: Provide joint sealants, backings, and other related materials that are compatible with one another and with joint substrates under conditions of service and application, as demonstrated by sealant manufacturer, based on testing and field experience.

B. VOC Content of Interior Sealants: Provide interior sealants and sealant primers that comply with the following limits for VOC content limits when calculated according to South Coast Air Quality Management District (SCAQMD) Rule 1168, and must meet or exceed the requirements for the Bay Area Quality Management District Regulation 8, Rule 5.

1. Sealants: 250 g/L.

2. Sealant Primers for Nonporous Substrates: 250 g/L.

3. Sealant Primers for Porous Substrates: 775 g/L.

2.2 MANUFACTURERS

A. Manufacturers and their products are listed for each type of sealant. Acceptable manufacturers include the following:

1. Dow Consumer Solutions, www.consumer.dow.com.

2. General Electric Co., www.gesealants.com.

3. Pecora Corp., www.pecora.com.

4. Sika Corp., www.sikausa.com.

5. Sonneborn/ChemRex, www.chemrex.com.

6. Tremco, Inc., www.tremcosealants.com.

7. United States Gypsum Co., www.usg.com.

8. W.R. Meadows, Inc., www.wrmeadows.com.

B. Substitutions: Under provisions of Section 01 25 13.

2.3 SEALANTS

A. Type A - Acrylic Latex: One-part, non-sag, mildew resistant acrylic emulsion compound complying with ASTM C834, Type S, Grade NS, formulated to be paintable.

1. Tremco, Inc., Acrylic Latex Caulk.

2. Pecora Corporation, AC-20.

3. Sonneborn, Chemrex, Sonolac.

B. Type B - Butyl Sealant: One-part, non-sag solvent-release-curing sealant complying with FS TT-S-001657 for Type 1 and formulated with a minimum of 75 percent solids.

1. Tremco, Inc., Tremco Butyl Sealant.

2. Pecora Corporation, BC-158.

3. Sonneborn, Chemrex, Multi-Purpose Sealant.

C. Type C - Silicone Sealant: One-part nonacid-curing silicone sealant complying with ASTM C920, Type S, Grade NS, Class 25.

1. Dow Consumer Solutions, Dowsil 790.

2. General Electric Co., Silpruf.

3. Tremco, Inc., Spectrem 1.

4. Pecora Corp., 864 or 890.

5. Sonneborn/Chemrex, Omniseal.

D. Type D - Non-Sag Polyurethane Sealant: Single component sealant complying with ASTM C920, Type S, Grade NS, Class 25:

1. Pecora Corp., Dynatrol I-XL.

2. Tremco, Inc., Vulkem 921.

3. Sika Corp., Sikaflex 1a.

4. Sonneborn/ChemRex, Sonolastic NP-1.

E. Type E - Neutral-Curing Silicone Sealant: One part medium modulus neutral-curing silicone sealant complying with ASTM C920, Type S, Grade NS, Class 25.

1. Dow Consumer Solutions, Dowsil 795.

2. General Electric Co., Ultraglaze 4000.

3. Tremco, Inc., Spectrum 3.

4. Pecora Corp., 895.

F. Type F - One-Part Mildew-Resistant Silicone Sealant: Complying with ASTM C920, Type S, Grade NS, Class 25.

1. Dow Consumer Solutions, Dowsil 786.

2. General Electric Co., Sanitary 1700.

3. Tremco, Inc., Tremsil 200.

4. Pecora Corp., 863 or 898 White.

G. Type G - Multi-Part Pourable Sealant: Complying with ASTM C920, Type M, Grade P, Class 25. Shore A hardness +40.

1. Tremco, Inc., THC900/901.

2. Pecora Corp., Dynatred or Urexpan NR-200.

3. Sika Corporation, Sikaflex 2c NS TG.

4. W.R. Meadows, Pourthane NS/SL.

H. Type H - Acoustical Sealant: Nondrying, nonhardening permanently flexible conforming to ASTM C834.

1. Pecora Corp., AIS-919 Acoustical Sealant.

2. Tremco, Inc., Tremco Acoustical Sealant.

3. United States Gypsum Co., Sheetrock Acoustical Sealant.

2.4 ACCESSORIES

A. Primer: Non-staining type, recommended by sealant manufacturer to suit application.

B. Joint Cleaner: Non-corrosive and non-staining type, recommended by sealant manufacturer; compatible with joint forming materials.

C. Joint Backing: ASTM D1056; round, closed cell polyethylene foam rod; oversized 30 to 50 percent larger than joint width.

D. Bond Breaker: Pressure sensitive tape recommended by sealant manufacturer to suit application.

3. PART 3 EXECUTION

3.1 EXAMINATION

A. Verify that joint openings are ready to receive Work and field measurements are as shown on Drawings and recommended by the manufacturer.

B. Beginning of installation means installer accepts existing substrate.

3.2 PREPARATION

A. Clean and prime joints in accordance with manufacturer's instructions. Prime if recommended by manufacturer.

B. Remove loose materials and foreign matter which might impair adhesion of sealant.

C. Verify that joint backing and release tapes are compatible with sealant.

D. Perform preparation in accordance with ASTM C1193.

E. Protect elements surrounding the Work of this Section from damage or disfiguration.

3.3 INSTALLATION

A. Install sealant in accordance with manufacturer's instructions.

B. Measure joint dimensions and size materials to achieve required width/depth ratios.

C. Install joint backing to achieve a neck dimension no greater than 1/3 the joint width.

D. Install bond breaker where joint backing is not used.

E. Apply sealant within recommended application temperature ranges. Consult manufacturer when sealant cannot be applied within these temperature ranges.

F. Install sealant free of air pockets, foreign embedded matter, ridges, and sags.

G. Tool joints concave unless otherwise detailed.

3.4 CLEANING AND REPAIRING

A. Clean work under provisions of Section 01 77 00.

B. Clean adjacent soiled surfaces.

C. Repair or replace defaced or disfigured finishes caused by Work of this Section.

3.5 PROTECTION OF FINISHED WORK

A. Protect sealants until cured.

B. Sprinkler fine silica sand on sealant of exterior concrete paving joints to reduce tracking of sealant.

3.6 SCHEDULE

	Type	Location	Color
A.	Type A - Acrylic Latex Cure	All interior joints not otherwise scheduled	To match adjacent surfaces
B.	Type B - Butyl	Under thresholds	Black
C.	Type C - One-Part Nonacid Curing Silicone	Exterior door, entrance and window frames prefinished metal flashing.	To match adjacent material
D.	Type D - Non-Sag Polyurethane Sealant	Exterior door, entrance and window frames.	To match adjacent surface.
E.	Type E - Neutral-Curing Silicone	Joints within glass and glazing.	Translucent

F. Type F - Mildew-Resistant Silicone	Interior joints in ceramic tile and at plumbing fixtures.	White
G. Type G - Multi-part Pourable Urethane	Exterior and interior joints in horizontal surfaces of concrete.	To match adjacent material
H. Type H - Acoustical Sealant	Interior walls between stud track/runner and adjacent construction. Between outlet boxes and gypsum board.	White

END OF SECTION 07 92 00

SECTION 08 11 13

HOLLOW METAL DOORS AND FRAMES

1. PART 1 GENERAL

1.1 WORK INCLUDED

A. Non-rated and fire rated rolled steel doors and frames.

B. Interior and exterior light frames.

C. Louvers.

1.2 REFERENCES

A. ANSI A250.8 - Recommended Specification for Standard Steel Doors and Frames.

B. ANSI A250.3 - Test Procedure and Acceptance Criteria for Factory-Applied Finish Painted Steel Surfaces for Steel Doors and Frames.

C. ANSI A250.10 - Test Procedure and Acceptance Criteria for Prime Painted Steel Surfaces for Steel Doors and Frames.

D. ASTM A653 - Steel Sheet, Zinc Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process.

E. ASTM C665 - Standard Specification for Mineral-Fiber Blanket Thermal Insulation.

F. ASTM A924 - General Requirements for Steel Sheet, Zinc-Coated (Galvanized) by the Hot-Dip Process.

G. ASTM E136 - Standard Test Method for Behavior of Materials in a Vertical Tube Furnace.

H. CEC - California Energy Commission.

I. NFPA 80 - Fire Doors and Windows.

J. ANSI/SDI A250.11 - Recommended Erection Instructions for Steel Frames.

K. DHI - Door and Hardware Institute.

L. CBC - California Building Code, (CCR) California Code of Regulations, Title 24, Part 2 and Part 6.

M. UL 9 - Fire Tests of Window Assemblies.

N. UL 10C - Fire Tests of Door Assemblies.

1.3 QUALITY ASSURANCE

A. Conform to requirements of ANSI A250.8.

B. Fire rated door and frame construction to conform to UL 9 and UL 10C.

C. Installed frame and door assembly to conform to NFPA 80 for fire rated class indicated on Drawings.

D. Installed exterior frame and door assembly to be weather tight.

E. Manufacturer shall have both fabrication and assembly plant located within the continental United States or Canada. Products that are either fabricated or assembled outside the continental United States or Canada are not acceptable.

1.4 PERFORMANCE REQUIREMENTS

A. Thermal Performance: Glazed exterior borrowed lite, sidelite and transom lite frames shall have an overall minimum U-value of 0.71 as rated in accordance with the default table method approved by the California Energy Commission (CEC). Provide Certificate NRCC-ENV-05-E, from the Nonresidential Compliance Manual documenting compliance with the CBC, California Building Code, (CCR) California Code of Regulations, Title 24, Part 6, Section 110, Table 110.6-A.

B. Solar Heat Gain Coefficient: Glazed exterior borrowed lite, sidelite and transom lite frames shall have an overall maximum solar heat gain coefficient of 0.60 as rated in accordance with default table method approved by the California Energy Commission (CEC). Provide Certificate NRCC-ENV-05-E, from the Nonresidential Compliance Manual documenting compliance with the CBC, California Building Code, (CCR) California Code of Regulations, Title 24, Part 6, Section 110, Table 110.6-B.

1.5 REGULATORY REQUIREMENTS

A. Conform to CBC, California Building Code, (CCR) California Code of Regulations, Title 24, Part 2 for fire rated frames and doors.

B. Conform to CBC, California Building Code, (CCR) California Code of Regulations, Title 24, Part 6, for U-value and solar heat gain coefficient.

1.6 SUBMITTALS

A. Submit shop drawings and product data under provisions of Section 01 33 00.

B. Indicate frame configuration, anchor types and spacings, location of cutouts for hardware, reinforcement, and finish.

C. Indicate door elevations, internal reinforcement, closure method, and cut outs for glazing and louvers.

D. Submit two samples of exterior frame profile at mullion intersection.

E. Submit Certificate NRCC-ENV-05-E, from the Nonresidential Compliance Manual documenting compliance with the CBC, California Building Code, (CCR) California Code of Regulations, Title 24, Part 6, Section 110, Table 110.6-A and 110.6-B.

1.7 DELIVERY, STORAGE AND PROTECTION

A. Deliver, store, protect, and handle products under provisions of Section 01 61 00.

B. Store products on site under cover.

C. Place products on at least 4 inch wood sills to prevent rust and damage.

D. Protect doors and frames with resilient packaging.

1.8 SEQUENCING AND SCHEDULING

A. Sequence Work under the provisions of Section 01 11 00.

B. Schedule Work under the provisions of Section 01 32 16.

C. Schedule delivery of all doors and frames so as not to delay progress of other trades.

2. PART 2 PRODUCTS

2.1 ACCEPTABLE MANUFACTURERS

A. Curries Mfg., Inc., www.curries.com.

B. DCI Hollow Metal, www.dcihollowmetal.com.

C. Fleming, www.flemingdoor.com.

D. Krieger Steel Products Company, www.kriegersteel.com.

E. Republic Builders Products Corporation, www.republicdoor.com.

F. Security Metal Products, www.secmet.com.

G. Steelcraft, www.steelcraft.com.

H. Stiles Custom Metal, Inc., www.hollowmetal.com.

I. Titan Metal Products, Inc., www.titanmetalinc.com.

J. Substitutions: Under provisions of Section 01 25 13.

2.2 DOORS AND FRAMES

A. Steel: Commercial quality cold rolled steel conforming to ASTM A653 galvanized to A60 or G60 coating class or Type B, A40 (ZF120) according to ASTM A924 with minimized spangle, mill phosphatized.

B. Exterior Doors: ANSI A250.8, Level 3, extra heavy-duty, Model 2, continuous welded seam, beveled edges, minimum 0.053 inch thick faces.

C. Interior Doors: ANSI A250.8, Level 2 heavy duty, Model 1, beveled edges, minimum 0.042 inch thick faces.

D. Exterior Frames: ANSI A250.8, Level 3, 0.067 inch thick material, core thickness.

E. Interior Frames: ANSI A250.8, Level 2, 0.053 inch thick material, core thickness.

2.3 DOOR CORE

A. Exterior Core: Polystyrene insulation.

B. Interior Door Core: Impregnated cardboard honeycomb.

2.4 ACCESSORIES

A. Louvers: Roll formed steel, prime coated, inverted 'Y' blade, sightproof, with countersink, tamperproof fasteners.

B. Rubber Silencers: Resilient rubber as supplied by Section 08 71 00.

C. Glazing Stops: Rolled steel channel shape, mitered corners; prepared for countersink style tamperproof screws at door installations, square butt at light frames.

D. Mineral-Fiber Insulation: ASTM C665, Type 1, without membrane facing; slag or rock wool fibers; with maximum flame spread and smoke developed indexes of 25 and 50; passing ASTM E136 for combustion characteristics.

2.5 FRAME ANCHORS

A. Wood Stud Anchor: U-shaped anchor, welded to frame, 1 inch wide, 0.053 inch thick steel, with 2 pre-punched holes in nailing flange. UL listed as required for fire rating.

2.6 PROTECTIVE COATINGS

A. Primer: Clean and treat with three stage iron phosphate process. Provide baked-on shop coat of EPA compliant gray synthetic rust - inhibitive enamel primer meeting acceptance criteria of ANSI 250.10.

B. The frame underneath the glazing stops and the inside of the glazing stop area shall be treated for maximum paint adhesion and prime painted with a rust inhibitive primer prior to installation of the frame.

2.7 HARDWARE REINFORCEMENT

A. Fabricate frames and doors with hardware reinforcement plates welded in place.

B. Hinge reinforcing shall be full width of frame profile.

C. Provide spacers for all thru-bolted hardware.

D. Reinforcement components shall be the following minimum thickness:

1.	Hinge (door and frame)	3/16 inch
2.	Mortise Lock or Deadbolt	0.093 inch
3.	Bored Lock or Deadbolt	0.093 inch
4.	Flush Bolt Front	0.093 inch
5.	Surface Bolt	0.093 inch
6.	Surface Applied Closer	0.093 inch
7.	Hold Open Arm	0.093 inch
8.	Pull Plates and Bars	0.067 inch
9.	Surface Exit Device	0.093 inch
10.	Floor Checking Hinge	0.167 inch
11.	Pivot Hinge	0.167 inch

2.8 FABRICATION

A. When shipping limitations so dictate, frames for large openings shall be fabricated in sections designed for splicing.

B. All spliced joints shall occur on the interior side of exterior frames.

C. Fabricate frames as full profile welded units.

D. All face, rabbet and soffit joints between abutting members shall be continuously welded and finished smooth when exposed to exterior.

E. Corner joints shall have all contact edges closed tight, with faces mitered and continuously welded.

F. Frames with multiple openings shall have mullion members fabricated with no visible seams or joints. All face, rabbet and soffit joints between abutted members shall be continuously welded and finished smooth when exposed to exterior.

G. Provide 3/8 inch back bend return on frames where gypsum board wall material occurs whether on one or both sides.

H. Dust cover boxes or mortar guards of 0.016 inch thick steel shall be provided at all hardware mortises on frames.

I. Reinforce frames wider than 48 inches with roll formed, 0.093 inch thick steel channels fitted tightly and welded into frame head, inverted U-shape profile.

J. Prepare frame for silencers except for frames which receive weatherstripping. Provide three single rubber silencers for single doors on strike side, and two single silencers on frame head at double doors without mullions.

K. Provide steel spreader temporarily attached to feet of both jambs as a brace during shipping and handling. Spreader is not to be used for installation purposes.

L. Attach fire rated label to each frame and door unit.

M. Close top edge of exterior door flush with inverted steel channel closure. Weld all joints watertight.

2.9 MANUFACTURING TOLERANCE

A. Manufacturing tolerance shall be maintained within the following limits:

1.	Frame width	+1/16 inch -1/32 inch
2.	Frame height	+-3/64 inch
3.	Frame face	+-1/32 inch
4.	Frame stop	+-1/32 inch
5.	Frame rabbet	+-1/64 inch
6.	Frame depth	+-1/32 inch
7.	Frame throat	+-1/16 inch
8.	Door width and height	+-3/64 inch
9.	Door thickness	+-1/16 inch
10.	Hardware location	+-1/32 inch
11.	Door flatness	+-1/16 inch

2.10 FINISH

A. Primer: Baked on rust-inhibitive enamel.

B. Finish: Site paint under provisions of Section 09 90 00.

3. PART 3 EXECUTION

3.1 INSTALLATION

A. Install frames in accordance with ANSI/SDI A250.11.

B. Install doors in accordance with DHI.

C. Install fire doors and frames in accordance with NFPA 80.

D. Installation of exterior doors and frames to be weathertight and waterproof.

E. Seal penetration of all surface applied screws on exterior face of frames at glass stops and hardware attachments.

F. Coordinate installation with electrically controlled locks.

G. Coordinate with wall construction and details for anchor placement. Provide anchors as follows:

1. Frames up to 7'-6" height - 4 anchors each jamb.

2. Frames 7'-6" to 8'-0" height - 5 anchors each jamb. Plus an additional anchor for each 2' or fraction thereof over 8'-0".

3. Frames for Double Doors: Minimum of 2 anchors in head approximately 12 inches from each jamb.

4. Borrowed Lite Frames: 2 anchors each jamb plus 1 for each 18 inches or fraction thereof over 3'-0". Minimum 2 anchors in head and sill approximately 12 inches from each jamb plus 1 for each 30 inches of length or fraction thereof.

H. Frames installed in masonry walls to be fully grouted with masonry grout.

I. Exposed field welds to be finished smooth and touched up.

J. Primed or painted surfaces which are scratched or marred shall be touched up.

K. Hardware to be applied in accordance with hardware manufacturer's templates and instructions.

L. Coordinate installation of glass and glazing.

M. Install door louvers.

N. Install roll formed steel reinforcement channels between two abutting frames. Anchor to structure and floor.

O. Solidly pack mineral-fiber insulation into frames installed in exterior walls that are not solid grouted. For vertical and horizontal frame mullions that are inaccessible after frame assembly place insulation into frame before joining members together.

3.2 INSTALLATION TOLERANCES

A. Edge clearance for swinging doors shall not exceed the following:

1.	Between door and frame at head and jamb	1/8 inch
2.	Between edge of pair of doors	1/8 inch
3.	At door sill with threshold (From bottom of door to top of threshold)	3/8 inch
4.	At door sill with no threshold	1/2 inch

5.	At door bottom and rigid floor covering per NFPA 80	1/2 inch
6.	At door bottom and nominal floor covering per NFPA 80	5/8 inch

B. Frame installation tolerance shall not exceed the following:

1.	Squareness	+-1/16 inch
2.	Alignment	+-1/16 inch
3.	Plumbness	+-1/16 inch
4.	Diagonal Distortion	+-1/32 inch

END OF SECTION 08 11 13

SECTION 08 14 16 FLUSH WOOD DOORS

PART 1 GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section includes requirements for Flush Wood Doors but not limited to:
   1. Certified, fire-rated and non-rated, flush panel wood doors.
   2. Integration of a security system.
   3. Factory fitting flush wood doors to frames and factory machining for hardware.
   4. Accessories necessary for a complete installation.

B. Related Sections:
   1. Section 05 50 00: Metal Fabrications.
   2. Section 07 92 00: Joint Sealants.
   3. Section 08 11 13: Hollow Metal Doors and Frames.
   4. Section 08 80 00: Glazing.
   5. Section 09 21 16: Gypsum Board Assemblies.

1.3 SUBMITTALS

A. Product Data:
   1. Technical data for each type of door indicated:
      a. Include details of core and edge construction, louvers, and trim for openings.
      b. Include factory finishing specifications.
      c. Include laboratory test report results of hinge loading, cycle/slam, stile edge screw withdrawals, and stile edge split resistance for fire rated doors.

B. Shop Drawings:
   1. Indicate location, size, and hand of each door; elevation of each kind of door; construction details not covered in Product Data; and the following:
      a. Dimensions and locations of blocking.
      b. Dimensions and locations of mortises and holes for hardware.
      c. Dimensions and locations of cutouts.
      d. Undercuts.
      e. Requirements for veneer matching.
      f. Doors to be factory finished and finish requirements.
      g. Fire-protection ratings for fire rated doors.

C. Certificate of Compliance for Fire Rated Doors: Provide copies of Certificate of Compliance for fire rated door assemblies and smoke and draft control door assemblies.

D. Certificate of Compliance regarding WI construction grade.

E. Certificate of Compliance regarding WI installation requirements.

1.4 QUALITY ASSURANCE

A. Regulatory Requirements:
   1. Fire rated wood doors - NFPA 80 listed and labeled by UL for fire protection ratings indicated, based on testing at positive pressure according to UL 10C:
      a. Oversize fire rated door assemblies: For units exceeding sizes of tested assemblies, provide certification by a qualified testing agency that doors comply with standard construction requirements for tested and labeled fire-rated door assemblies except for size.
      b. Temperature rise limit: At vertical exit enclosures and exit passageways, provide doors that have a maximum transmitted temperature end point of not more than 450 degrees F above ambient after 30 minutes of standard fire-test exposure.
   2. Smoke and draft control door assemblies: Listed and labeled for smoke and draft control, based on testing according to UL 1784.
   3. Accessibility requirements - comply with applicable requirements:
      a. Americans with Disabilities Act of 1990, as amended:
         1) ADA Title II Regulations & the 2016 ADA Standards for Accessible Design.
      b. CBC 2022 California Building Code (CCR Title 24, Part 2, as adopted and amended by DSA:
         2) CBC Chapter 11B, Access to Public Buildings, Public Accommodations, Commercial Buildings and Public Housing.
   4. Quality standard: In addition to requirements specified, comply with Woodwork Institute WI Manual of Millwork
   5. Maintain at least one copy of WI Manual for reference at jobsite throughout installation period.

B. Source Limitations: Obtain flush wood doors through one (1) source from a single manufacturer.

C. Pre-Installation Conference: Conduct conference at site.

1.5 WARRANTY

A. Warranty:
   1. Written warranty signed by manufacturer, installer, and Contractor, in which manufacturer agrees to repair or replace doors that are defective in materials or workmanship. A representative of the door manufacturer shall inspect the installed doors and shall note on the warranty that no provisions of the warranty have been nullified in the manufacture and/or installation:
      a. Failures include, but are not limited to, the following:
         1) Warping (bow, cup, or twist) more than 1/4-inch in a 42-inch by 84-inch section.
         2) Telegraphing of core construction in face veneers exceeding 0.01-inch in a three-inch span.
      b. Warranty include installation and finishing that may be required due to repair or replacement of defective doors.
      c. Warranty period for solid core exterior doors: Five (5) years from date of Substantial Completion.
      d. Warranty period for solid core interior doors: Life of installation.

1.6 DELIVERY, STORAGE, AND HANDLING

A. Protect wood doors during transit, storage, and handling to prevent damage, soiling, and deterioration. Store wood doors on a flat level surface in a dry, well ventilated, place. Keep wood doors a minimum of 3-1/2 inches off floor surface and protected by a protective covering under the bottom door and over the top door. Covering should protect wood doors from dirt, water, and abuse but allow for air circulation under and around the stack. Do not store wood doors in direct sunlight. Comply with requirements of referenced standard and

manufacturer's written instructions.

B. Package doors individually in heavy duty cardboard cartons prior to shipment from factory. Mark each door on top and bottom rail with opening number used on shop drawings using temporary, removable, or concealed markings.

C. Handle wood doors with clean gloves. Lift and carry wood doors when moving them around the site; do not drag wood doors across one another.

PART 2 PRODUCTS

2.1 MATERIALS

A. Manufacturers are subject to compliance with requirements; provide flush wood door products by one of the following:
   1. **Oregon Door Company - Basis of Design.**
   2. Haley Brothers, Inc.
   3. Weyerhaeuser.
   4. Approved equal.

B. Fire Rated Wood Doors - Doors complying with NFPA 80 that are listed and labeled by a qualified testing agency, for fire protection ratings indicated, based on testing at positive pressure according to NFPA 252 or UL 10C:
   1. Cores: Provide core specified or mineral core as necessary to provide fire protection rating indicated.
   2. Edge construction: Provide edge construction with intumescent seals concealed by outer stile. Comply with specified requirements for exposed edges.
   3. Pairs: Provide fire retardant stiles listed and labeled for applications indicated without formed steel edges and astragals. Provide stiles with concealed intumescent seals. Comply with specified requirements for exposed edges.
   4. Pairs:
      a. Provide formed steel edges and astragals with intumescent seals:
         1) Finish steel edges and astragals with baked enamel same color as doors.
         2) Finish steel edges and astragals to match door hardware (locksets or exit devices).

C. Smoke and Draft Control Door Assemblies: Listed and labeled for smoke and draft control, based on testing according to UL 1784.

D. Exterior Solid-Core Doors:
   1. Grade: Custom (Grade AA faces).
   2. Species: **Walnut**
   3. Cut/Finish: **Plain sliced with clear stain finish**
   4. Match between Veneer Leaves: **Book and/or Slip match.**
   5. Assembly of Veneer Leaves on Door Faces: Center-balance match where applicable.
   6. Pair and Set Match: Provide for doors hung in same opening or separated only by mullions.
   7. Exposed Vertical and Top Edges: Same species as faces – edge.
   8. Core: Either glued wood stave or structural composite lumber.
   9. Construction: Five or seven plies. Stiles and rails are bonded to core, then entire unit is abrasive planed before veneering.
   10. Adhesives: Type I per WDMA T.M.-6.
   11. WDMA I.S.1-A Performance Grade: Extra Heavy Duty.

E. Interior Solid-Core Doors:
   1. Grade: Custom (Grade AA faces).
   2. Species: **Walnut**
   3. Cut/Finish: **Plain sliced with clear stain finish**
   4. Match between Veneer Leaves: **Book and/or Slip match.**
   5. Assembly of Veneer Leaves on Door Faces: Center-balance match.
   6. Pair and Set Match: Provide for doors hung in same opening or separated only by mullions.
   7. Room Match: Match door faces within each separate room or area of building. Corridor-door faces do not need to match where they are separated by 20 feet or more.
   8. Room Match: Provide door faces of compatible color and grain within each separate room or area of building.
   9. Transom Match: Continuous match. Where applicable.
   10. Exposed Vertical and Top Edges: Same species as faces – edge.
   11. Core: Either glued wood stave or structural composite lumber.
   12. Construction: Five or seven plies. Stiles and rails are bonded to core, then entire unit is abrasive planed before veneering.
   13. WDMA I.S.1-A Performance Grade: Extra Heavy Duty.

2.2 LIGHT FRAMES AND LOUVERS

A. Metal Frames for Light Openings: Manufacturer’s standard frame formed of 0.048-inch thick, cold-rolled steel sheet; factory primed for paint.

B. Metal Frames for Light Openings in Fire-Rated Doors: Manufacturer's standard frame formed of 0.048-inch thick, cold-rolled steel sheet; factory primed for paint with baked-enamel or powder-coated finish and approved for use in doors of fire-protection rating indicated.

C. Metal Louvers:
   1. Manufacturers are subject to compliance with requirements; provide products by one of the following:
      a. Air Louvers; a Division of the Activar Construction Products Group.
      b. L & L Louvers.
      c. McGill Architectural Products.
      d. Approved equal.
   2. Blade type: Vision-proof, inverted V.
   3. Metal and finish: Hot-dip galvanized steel, 0.040-inch thick, factory primed for paint with baked-enamel or powder-coated finish.
   4. Metal and finish: Extruded aluminum with Class II, clear anodic finish, AA-M12C22A31.

2.3 FABRICATION

A. Factory fit doors to suit frame-opening sizes indicated. Comply with clearance requirements of referenced quality assurance standard for fitting unless otherwise indicated:
   1. Comply with NFPA 80 requirements for fire-rated doors.

B. Factory machine doors for hardware that is not surface applied. Locate hardware to comply with DHI-WDHS-3. Comply with final hardware schedules, door frame shop drawings, BHMA-156.115-W, and hardware templates:
   1. Coordinate with hardware mortises in metal frames to verify dimensions and alignment before factory machining.
   2. Metal astragals: Factory machine astragals and formed-steel edges for hardware for pairs of fire-rated doors.

C. Transom and Side Panels:

1. Fabricate matching panels with same construction, exposed surfaces, and finish as specified for associated doors. Finish bottom edges of transoms and top edges of rabbeted doors same as door stiles:
   a. Fabricate door and transom panels with full-width, solid-lumber, rabbeted, meeting rails. Provide factory-installed spring bolts for concealed attachment into jambs of metal door frames.

D. Openings:
1. Factory cut and trim openings through doors:
   a. Light openings: Trim openings with moldings of material and profile indicated.
   b. Glazing: Factory install glazing in doors indicated to be factory finished. Comply with applicable requirements in Section 08 80 00: Glazing.
   c. Louvers: Factory install louvers in prepared openings.

E. Exterior Doors:
1. Factory treat exterior doors with water repellent after fabrication has been completed but before factory finishing.
2. Flash top of outswinging doors with manufacturer's standard metal flashing.

2.4 SHOP PRIMING

A. Doors for Transparent Finish: Shop prime faces and all four edges with stain (if required), other required pretreatments, and first coat of finish as specified in Section 09 90 00: Painting and Coating. Seal edges of cutouts and mortises with first coat of finish.

B. Doors for Opaque Finish: Shop prime faces, all four edges, edges of cutouts, and mortises with one coat of wood primer, by manufacturer or as listed in 09 90 00: Paint and Coatings.

2.5 FACTORY FINISHING

A. General – For factory finish doors, factory finish doors that are indicated to receive transparent finish, and factory finish doors where indicated in schedules or on Drawings as factory finished:
1. Comply with referenced quality standard for factory finishing. Complete fabrication, including fitting doors for openings and machining for hardware that is not surface applied, before finishing:
   a. Finish faces, all four edges, edges of cutouts, and mortises. Stains and fillers may be omitted on top and bottom edges, edges of cutouts, and mortises.
2. Use only paints and coatings that comply with the testing and product requirements of the California Department of Health Services' "Standard Practice for the Testing of Volatile Organic Emissions from Various Sources Using Small-Scale Environmental Chambers." Prefer products that are third-party certified through GREENGUARD.

B. Transparent Finish:
1. Grade: Premium.
2. Finish: WI's Architectural Woodwork Standards Section 9, UV curable, acylated epoxy, polyester, or urethane; refer to Drawings for finish designation.
3. Staining: As selected by Architect from manufacturer's full range.
4. Effect: Semi-filled finish, produced by applying an additional finish coat to partially fill the wood pores.
5. Sheen: Satin Gloss.

PART 3 EXECUTION

3.1 FIELD CONDITIONS

A. Environmental Limitations: Do not deliver or install doors until spaces are enclosed and weathertight, wet work in spaces is complete and dry, and HVAC system is operating and maintaining ambient temperature and humidity conditions at occupancy levels during remainder of construction period.

3.2 EXAMINATION

A. Examine doors and installed door frames, with installer present, before hanging doors:
   1. Verify that installed frames comply with indicated requirements for type, size, location, and swing characteristics and have been installed with level heads and plumb jambs.
   2. Reject doors with defects.

B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.3 INSTALLATION

A. Hardware: For installation, see Section 08 71 00: Door Hardware.

B. Installation Instructions:
   1. Install doors to comply with manufacturer's written instructions, referenced quality standard, and as indicated:
      a. Install fire-rated doors according to NFPA 80.
      b. Install smoke and draft-control doors according to NFPA 105.

C. Job-Fitted Doors:
   1. Align and fit doors in frames with uniform clearances and bevels as indicated below; do not trim stiles and rails in excess of limits set by manufacturer or permitted for fire-rated doors. Machine doors for hardware. Seal edges of doors, edges of cutouts, and mortises after fitting and machining:
      a. Clearances:
         1) Provide 1/8 inch at heads, jambs, and between pairs of doors. Provide 3/8 inch from bottom of door to top of decorative floor finish or covering unless otherwise indicated. Where threshold is shown or scheduled, provide 1/4 inch from bottom of door to top of threshold unless otherwise indicated:
            a) Comply with NFPA 80 for fire-rated doors.
      b. Bevel non-fire-rated doors 1/8 inch in two inches (2”) - 3-1/2 degrees - at lock and hinge edges.
      c. Bevel fire-rated doors 1/8 inch in two inches (2”) - 3-1/2 degrees- at lock edge; trim stiles and rails only to extent permitted by labeling agency.

D. Factory Fitted Doors: Align in frames for uniform clearance at each edge.

E. Factory Finished Doors: Restore finish before installation if fitting or machining is required at Project site.

3.4 ADJUSTING

A. Operation: Rehang or replace doors that do not swing or operate freely.

B. Finished Doors: Replace doors that are damaged or that do not comply with requirements. Doors may be repaired or refinished if work complies with requirements and shows no evidence of repair or refinishing.

END OF SECTION 08 14 16

SECTION 08 31 13 ACCESS DOORS AND FRAMES

PART 1 GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section includes access doors in gypsum board, masonry partitions, and plaster/stucco soffits, where shown or required.

B. Related Sections:
1. Section 05 50 00: Metal Fabrications.
2. Section 06 10 00: Rough Carpentry.
3. Section 06 83 16: Fiberglass Reinforced Paneling.
4. Section 07 42 13: Metal Composite Material Wall Panels.
5. Section 08 11 13: Hollow Metal Doors and Frames.
6. Section 09 21 16: Gypsum Board Assemblies.
7. Section 09 30 00: Tiling.
8. Section 09 51 00: Acoustical Ceiling Panels.

1.3 SUBMITTALS

A. Product Data:
1. Manufacturer's literature, including schedules, charts, installation instructions, and illustrations to indicate the performance, fabrication, procedures, product variations, and accessories.

PART 2 PRODUCTS

2.1 MANUFACTURERS

A. Manufacturers listed whose products meet or exceed the specifications are approved for use on the Project. Other manufacturers must have a minimum of five (5) years' experience manufacturing access doors meeting or exceeding the specifications and comply with Division 01 requirements regarding substitutions in order to be considered:
1. J. L. Industries, Commerce, CA (basis of design for rated floors).
2. Karp Associates, Inc., Melville, NY (basis of design).
3. The Bilco Company, New Haven, CT.
4. Babcock-Davis, San Lorenzo, CA.
5. Larsen's Manufacturing Co., Minneapolis, MN.
6. Milcor, Grand Rapids, MI.
7. Approved equal.

2.2 PRODUCTS

A. Standard type flush steel access door for plaster/stucco soffit construction:
1. Size: As shown on the Drawings.
2. Hinges: Concealed continuous piano type hinges.
3. Finish: Phosphate dipped and prime coated for field painting per Section 09 90 00: Painting and Coating.

4. Frames: 16-gauge galvanized steel with 22-gauge galvanized plaster casing bead.
5. Doors: 14-gauge galvanized steel.
6. Lock: Flush screwdriver operated cam.

B. Fire Rated, Two-Hour, Floor Access Door - Flush steel door for wallboard construction:
1. Listing: UL listed, compliant to NFPA 288.
2. Size: As shown on the Drawings.
3. Hinges: Heavy-duty Type 316 stainless steel butt hinge.
4. Finish: 20-gauge galvanized metal with gray primer on exterior frame; field painting per Section 09 90 00: Painting and Coating.
5. Frames: Extruded aluminum.
6. Doors: Single leaf.
7. Lock: Knurled knob/key operated latch bolt.
8. Insulation: Two-inch (2”) thick fire rated mineral fiber

C. Non-Rated Floor Access Door:
1. Listing: Not required.
2. Size: As shown on the Drawings.
3. Hinges: Heavy-duty Type 316 stainless steel butt hinge.
4. Finish: 20-Gauge galvanized finish with gray primer on exterior frame; field painting per Section 09 90 00: Painting and Coating.
5. Frames: 20-Gauge galvanized steel. Anchor to wood floor.
6. Doors: Single leaf.
7. Lock: Knurled knob/key operated latch bolt.
8. Hold open door.

D. Ceiling Access Door:
1. Listing: Not required.
2. Size: As shown on the Drawings.
3. Hinges: Heavy-duty Type 316 stainless steel butt hinge.
4. Finish: 20-gauge galvanized finish with gray primer on exterior frame; field painting per Section 09 90 00: Painting and Coating.
5. Frames: Extruded aluminum. Anchor to wood floor.
6. Doors: Single leaf.
7. Lock: Knurled knob/key operated latch bolt.
8. Hold open door.

PART 3 EXECUTION

3.1 INSTALLATION

A. Locate and provide access doors in walls (and floors) to construct the wall as indicated on Drawings and provide access doors and panels to fit the wall condition. Maintain designated wall types as indicated on Drawings.

3.2 LOCATIONS

A. Provide where required by code and where needed to service and maintain equipment.

B. If not shown on the Drawings, consult the Architect before locating in finished spaces.

END OF SECTION 08 31 13

SECTION 08 36 13 SECTIONAL OVERHEAD DOORS

1. PART 1 GENERAL

1.1 SECTION INCLUDES

A. Electric overhead sectional door.

B. Aluminum panels of stile and rail design.

C. Operating hardware, controls, and supports.

1.2 REFERENCES

A. ASTM B209 - Aluminum and Aluminum-Alloy Sheet and Plate.

B. ASTM B221 - Aluminum-Alloy Extruded Bars, Rods, Wire, Shapes, and Tubes.

C. NAGDM 102 - Sectional Overhead Type Door (NAGDM 102). (National Association of Garage Door Manufacturers)

D. NEMA MG 1 - Motors and Generators.

E. NFPA70 - National Electrical Code.

1.3 SYSTEM DESCRIPTION

A. Panels: Stile and rail aluminum with infill panels.

B. Standard lift operating style with track and hardware.

C. Operation: Center mounted drawbar electric trolley motor with chain hoist for manual operation.

D. Design and size components to withstand dead and live loads caused by pressure and suction of wind acting normal to plane of wall to a design pressure of 20 (85 mph) lb/sq ft as measured in accordance with ASTM E330.

1.4 SUBMITTALS

A. Submit under provisions of District’s Division 01 Requirements.

B. Shop Drawings: Indicate opening dimensions and required tolerances, connection details, anchorage spacing, hardware locations, and installation details.

C. Product Data: Provide component construction, anchorage method, and hardware.

D. Samples: Submit two exterior panel finish samples, 8 x 8 inch in size illustrating color and finish.

E. Manufacturer's Installation Instructions: Indicate special procedures and perimeter conditions requiring special attention.

1.5 OPERATION AND MAINTENANCE DATA

A. Submit under provisions of District's Division 01 Requirements.

B. Operation Data: Include electrical control adjustments.

C. Maintenance Data: Include data for motor and transmission, shaft and gearing, lubrication frequency, spare part sources.

1.6 QUALITY ASSURANCE

A. Perform Work in accordance with NAGDM 102 Application Type Industrial.

1.7 QUALIFICATIONS

A. Manufacturer: Company specializing in manufacturing the Products specified in this section with minimum ten years experience.

B. Installer: Company specializing in performing the work of this section with minimum five years experience approved by manufacturer.

1.8 REGULATORY REQUIREMENTS

A. Conform to applicable code for motor and motor control requirements.

B. Products Requiring Electrical Connection: Listed and classified by Underwriters' Laboratories, Inc., as suitable for the purpose specified and indicated.

1.9 WARRANTY

A. Provide two year warranty under provisions of District's Division 01 Requirements.

B. Warranty: Include coverage for electric motor and transmission.

2. PART 2 PRODUCTS

2.1 MANUFACTURERS

A. Overhead Door Corporation, www.overheaddoor.com.

B. Substitutions: Under provisions of District’s Division 01 General Requirements.

2.2 DOOR MATERIALS

A. Door Section Framing: Horizontal top and bottom rails and end and intermediate vertical stiles shall be extruded aluminum, 6063-T5 alloy with specified finish.

B. Door Section Panels: Sheet aluminum, 0.050 inch minimum thickness with specified finish. All edges fitted with vinyl edge moldings. Provide manufacturer standard louver panels at locations indicated on drawings.

C. Glass shall be 1/4 inch thick, tempered safety plate. Match tint of tempered tinted glazing specified in Section 08 80 00. Furnish and install all door glazing at the door factory.

D. Weatherstripping and Safety Edge:

1. Provide a safety edge along the bottom horizontal rail of the bottom door section for the full door width, electrically interconnected to the door control panel. Safety edge, with black and yellow vinyl jacket as manufactured by Tech Strip Sales, (800) 874-4052.

2.3 DOOR HARDWARE

A. Track Rollers: Heavy duty steel tire type sized to roll within a 3 inch wide door track; provide with ball bearings in case-hardened inner and outer steel races and secured to a minimum 7/16 inch diameter steel shaft fitted into an extruded aluminum bracket for attachment to the inside face of each of the door sections and stiles.

B. Tracks:

1. Vertical Tracks: Minimum 3 inch wide x minimum 12 gage galvanized steel with continuous and slotted angle brackets for attachment to steel door jambs and with provision for end attachment to the front end of the horizontal tracks.

2. Horizontal Tracks: Same size, shape and material as the vertical tracks, reinforced with steel angle to provide the required rigidity and stability when the doors are fully opened in a horizontal position and shall be provided with spring type bumpers at the end of the tracks.

C. Hinges: Heavy duty piano type of 14 gage steel, 3 inch wide with 1/2 inch offset and with fixed 3/16 inch steel pin. Attach hinges to the inside face of the door section rails and to the end and intermediate vertical stiles with rust proof or galvanized steel pop-rivets or with through bolts (accessible from the inside of the building).

2.4 DOOR CONSTRUCTION

A. General: Door assemblies shall consist of seven door sections high of frame and recessed panel construction, designed to withstand minimum air and wind pressures of 24 lbs per sq. ft. of door surface when doors are in the closed position and shall not deflect more then 1/120 of the door width when doors are fully open in the horizontal position. Door sections shall contain aluminum and glass panels as indicated on the Drawings.

B. Framing for door sections: Vertical stiles and horizontal rails shall be of extruded aluminum shapes integrally reinforced for strength and rigidity and shall have a minimum wall thickness .090 inch, the top and bottom horizontal rails and the two end vertical stiles shall be 3-1/2 inches wide x 1-3/4 inches thick. The three intermediate vertical stiles (muntins) shall be 2-3/4 inches wide x 1-3/4 inches thick. The combined width of meeting rails shall be 2-3/4 inches wide x 1-3/4 inches thick. Intermediate meeting rails to have .130 stiffener the entire width of the rail and contain a .050 aluminum channel on both ends of all section. Intermediate sections shall be joined together with double hinges on both ends of all sections.

1. Top and bottom horizontal rail edges of the door sections shall be rabbetted to provide for weathertight joining of the door sections.

2. Joint rail and stiles together using 5/16 inch diameter through bolts with nuts and lock washers (accessible from the inside of the building) as per manufacturer's standard.

3. Reinforce the bottom rail of each of the 7 door sections as necessary to prevent any sag or deflection in excess of the limits specified in Article 2.4, Item A, with an extruded aluminum strut bolted to the integral strut on the rail section, the full door section width as indicated on the approved shop drawings.

C. Recessed aluminum and glass panels shall be secured in place from the interior side of the door in plumb and aligned position within the door section rail and stile framing and be attached in the place with snap-in-place extruded aluminum glazing moldings so that the vertical exposed face of the molding will be flush with the face of the door section framing.

D. Safety Edge shall be attached to the bottom horizontal rail of the bottom door section for the full door width as specified in Article 2.5, Item D.

2.5 ELECTRICAL DOOR OPERATOR

A. Operator: Heavy duty, equivalent to Overhead Door Model JST, center mounted unit, U.L. listed, 3/4 HP, 115/230 VAC single phase. Operator shall be of design to operate the door(s) at a speed of 1 foot per second, and to include disconnect switches reversing combination starter stations, 120/24 volt control transformer, field wiring, photo cell, etc.

B. Door Operator Features:

1. Rotary limit switches with vernier adjustment.

2. Adjustable disc clutch.

3. Drum type solenoid actuated brake.

4. Instant reversing continuous duty motor with automatic thermal overload reset.

5. Heavy duty reversing contractor - electrically and mechanically interlocked.

6. Heavy duty reversing magnetic starter and/or controller NEMA Type O, 120 volt, 60 Hz, AC, for operator motor.

7. Standard three button (open-close-stop) control for each door operator, recessed mounted.

C. Master Control Station: At the control station indicated on the drawings, provide three push buttons for each individual door (9 for the front doors and 9 for the rear doors). Provide green insert buttons for “open”, red insert buttons for “stop” and black insert button for “closing” action of the door operator. The control station shall be in a recessed, NEMA type enclosure with a 1/8 inch thick stainless steel panel face as detailed on the drawings.

D. Safety edge: Electrically connected to a double pole double throw switch which will instantly reverse the closing action of the door and return it to the fully open horizontal position when the safety edge contacts an object before the door reaches its fully closed vertical position.

E. Install one multi-code receiver on each motor. Receivers shall be either a multi-code 1090 or 1099. Confirm with owner prior ro purchasing the receivers. Program the receiver to work with the District’s existing 4 button multi-code remotes. Doors shall be programmed to auto close after being open for 2 minutes. Provide 1 receiver extension antenna on each receiver. Provide 3 four button multi-code transmitters.

F. Photo Eye: One for each overhead door. Designed to recycle timer if door is open, and reverse door in case of obstacle if door is in downward travel.

2.6 EMERGENCY MANUAL OPERATOR

A. Required: To open and close the door easily and smoothly within a maximum time limit of 1-1/2 minutes by hand operation of a chain hoist in case of power failure.

B. Chain Hoist Operator: Electrically and mechanically inter-locked to the door operator and the counterbalance assembly. The chain shall be a heavy duty cadmium plated continuous lock link type sized for comfortable and easy hand grip and shall be provided with guards to prevent chain from disengaging the gear sprockets.

2.7 FINISHES

G. Exterior and Interior Aluminum Surfaces: RAL 3002 Carmine Red.

3. PART 3 EXECUTION

3.1 EXAMINATION

A. Verify that wall openings are ready to receive work and opening dimensions and tolerances are within specified limits.

B. Beginning of installation means acceptance of existing surfaces.

3.2 PREPARATION

A. Prepare opening to permit correct installation of door unit to perimeter air and vapor barrier seal.

B. Verify that electric power is available and of the correct characteristics.

3.3 INSTALLATION

A. Install door unit assembly in accordance with manufacturer's instructions.

B. Anchor assembly to wall construction and building framing without distortion or stress.

C. Securely brace door tracks suspended from structure. Secure tracks to structural members only.

D. Fit and align door assembly including hardware, level and plumb, to provide smooth operation.

E. Coordinate installation of electrical service. Complete power and control wiring from disconnect to unit components.

F. Coordinate installation of sealants and backing materials at frame perimeter as specified in Section 07 92 00.

G. Install perimeter trim and closures.

3.4 TOLERANCES

A. Maximum variation from plumb: 1/16 inch.

B. Maximum variation from level: 1/16 inch.

C. Longitudinal or diagonal warp: Plus or minus 1/8 inch from 10 foot straight edge.

D. Maintain dimensional tolerances and alignment with adjacent work.

3.5 MANUFACTURER'S FIELD SERVICES

A. Prepare and start systems under provisions of District’s Division 01 Requirements.

B. Ensure the operation and adjustments to door assembly for smooth operation.

3.6 ADJUSTING

A. Adjust work under provisions of District's Division 01 Requirements.

B. Adjust door assembly to smooth operation. Doors making squealing, screeching, scratching noises shall not be accepted.

3.7 CLEANING

A. Clean work under provisions of District's Division 01 Requirements.

B. Clean doors, frames and glass.

C. Remove labels and visible markings.

3.8 PROTECTION OF FINISHED WORK

A. Protect finished Work under provisions of District's Division 01 Requirements.

B. Do not permit construction traffic through overhead door openings after adjustment and cleaning.

END OF SECTION

SECTION 08 41 13 ALUMINUM-FRAMED ENTRANCES AND STOREFRONTS

PART 1 GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section includes requirements including but not limited to:
   1. Exterior and interior storefront framing.
   2. Exterior and interior manual swing entrance doors.
   3. Accessories necessary for a complete installation.

B. Related Sections:
   1. Section 05 12 00: Structural Steel Framing.
   2. Section 05 40 00: Cold-Formed Metal Framing.
   3. Section 05 50 00: Metal Fabrications.
   4. Section 07 62 00: Sheet Metal Flashing and Trim.
   5. Section 07 92 00: Joint Sealants.

1.3 SUBMITTALS

A. Product Data: Technical data for each type of product indicated including construction details, material descriptions, dimensions of individual components and profiles, and finishes for aluminum framed systems.

B. Shop Drawings:
   1. Submit aluminum storefront framing and entrances shop drawings including plans, elevations, sections, full size details, and attachments to other work:
      a. Include details of provisions for system expansion and contraction and for drainage of moisture in the system to the exterior.
      b. For entrance doors, include hardware schedule and indicate operating hardware types, functions, quantities, and locations.

C. Entrance Door Hardware Schedule: Prepared by or under the supervision of supplier, detailing fabrication and assembly of entrance door hardware, as well as procedures and diagrams. Coordinate final entrance door hardware schedule with doors, frames, and related work to ensure proper size, thickness, hand, function, and finish of entrance door hardware.

D. Engineer’s calculations of performance requirements.

E. Maintenance Data: For aluminum framed systems to include in maintenance manuals.

1.4 PERFORMANCE REQUIREMENTS

A. Aluminum framed systems shall withstand the effects of specified performance requirements without exceeding performance criteria or fail due to defective manufacture, fabrication, installation, or other defects in construction:
   1. Movements of supporting structure indicated on Drawings including, but not limited to, story drift and deflection from uniformly distributed and concentrated live loads.

2. Dimensional tolerances of building frame and other adjacent construction.
3. Failure includes the following:
   a. Deflection exceeding specified limits.
   b. Thermal stresses transferring to building structure.
   c. Framing members transferring stresses, including those caused by thermal and structural movements to glazing.
   d. Noise or vibration created by wind and by thermal and structural movements.
   e. Loosening or weakening of fasteners, attachments, and other components.
   f. Sealant failure.
   g. Failure of operating units.

B. Structural Loads:
   1. Wind loads: Ultimate wind speed gust 115 mph; exposure D.

C. Deflection of Framing Members:
   1. Deflection normal to wall plane: Limited to edge of glass in a direction perpendicular to glass plane shall not exceed L/175 of the glass edge length for each individual glazing lite or an amount that restricts edge deflection of individual glazing lites to 3/4 inch (19 mm), whichever is less.
   2. Deflection parallel to glazing plane: Limited to L/360 of clear span or 1/8 inch (3.2 mm), whichever is smaller.

D. Structural Test Performance - Provide aluminum framed systems tested according to ASTM E330 as follows:
   1. When tested at positive and negative wind load design pressures, systems do not evidence deflection exceeding specified limits.
   2. When tested at 150 percent of positive and negative wind load design pressures, systems, including anchorage, do not evidence material failures, structural distress, and permanent deformation of main framing members exceeding 0.2 percent of span.
   3. Test durations: As required by design wind velocity, but not fewer than ten (10) seconds.

E. Air Infiltration: Provide aluminum-framed systems with maximum air leakage through fixed glazing and framing areas of 0.06 cfm/sq. ft.0.03 L/s per sq. m of fixed wall area when tested according to ASTM E283 at a minimum static-air-pressure difference of 6.24 lbf/sq. ft. (300 Pa.)

F. Water Penetration under Static Pressure: Provide aluminum-framed systems that do not evidence water penetration through fixed glazing and framing areas when tested according to ASTM E331 at a minimum static-air-pressure difference of 20 percent of positive wind-load design pressure, but not less than 6.24 lbf/sq. ft. (300 Pa.

G. Windborne Debris Impact Resistance:
   1. Pass missile impact and cyclic pressure tests when tested according to ASTM E1886 and testing information in ASTM E1996 for Wind Zone 4:
      a. Large missile test: For glazed openings located within 30 feet (9.1 m) of grade.

H. Thermal Movements:
   1. Provide aluminum-framed systems that allow for thermal movements resulting from the following maximum change (range) in ambient and surface temperatures. Base engineering calculation on surface temperatures of materials due to both solar heat gain and nighttime-sky heat loss:
      a. Temperature change (range): 120 degrees F (67 degrees C, ambient; 180 degrees F, 100 degrees C, material surfaces.
      b. Interior ambient-air temperature: 75 degrees F (24 degrees C).

I. Condensation Resistance: Provide aluminum framed systems with fixed glazing and framing areas having condensation-resistance factor (CRF) of not less than 45 when tested according to AAMA 1503.

J. Thermal Conductance: Provide aluminum framed systems with fixed glazing and framing areas having an average U-factor of not more than 0.57 Btu/sq. ft. x h x degrees F3.23 W/sq. m x K when tested according to AAMA 1503.

1.5 QUALITY ASSURANCE

A. Regulatory Requirements:
   1. Accessibility requirements:
      a. 2019 California Building Code: Section 11B-404.3 accessible route.
      b. 2019 California Building Code: Section 11B-309.4 operable parts interior usage.
      c. U.S. Architectural and Transportation Barriers Compliance Board Americans with Disabilities Act Accessibility Guidelines for Buildings and Facilities (ADAAG).
      d. ICC/ANSI A117.1 Accessible and Useable Building and Facilities.

B. Installer Qualifications: Installer having minimum ten (10) years' documented experience who is an authorized representative of the manufacturer and is trained and approved for installation of units required.

C. Engineering Responsibility: Prepare data for aluminum framed systems, including shop drawings, based on testing and engineering analysis of manufacturer's standard units in systems similar to those indicated.

D. Product Options:
   1. Information on Drawings and in Specifications establishes requirements for systems' aesthetic effects and performance characteristics. Aesthetic effects are indicated by dimensions, arrangements, alignment, and profiles of components and assemblies as they relate to sightlines, to one another, and to adjoining construction. Performance characteristics are indicated by criteria subject to verification by one or more methods including preconstruction testing, field testing, and in service performance:
      a. Do not revise intended aesthetic effects, as judged solely by Architect, except with Architect's approval. If revisions are proposed, submit comprehensive explanatory data to Architect for review.

E. Source Limitations: Obtain aluminum framed entrances from single source from single manufacturer.

F. Pre-Installation Conference: Conduct conference at site.

1.6 WARRANTY

A. Written warranty signed by manufacturer, Contractor, and installer in which manufacturer agrees to repair or replace components of aluminum framed systems that do not comply with requirements or that fail in materials or workmanship within specified warranty period.
   1. Failures include, but are not limited to, the following:
      a. Structural failures including, but not limited to, excessive deflection.
      b. Noise or vibration caused by thermal movements.
      c. Water leakage through fixed glazing and framing areas.
      d. Failure of operating components.
   2. Warranty period: Two (2) years from date of Substantial Completion.

B. Written warranty signed by manufacturer in which manufacturer agrees to repair or replace

components on which finishes do not comply with requirements or that fail in materials or workmanship within specified warranty period. Warranty does not include normal weathering:

1. Warranty period: Ten (10) years from date of Substantial Completion.

PART 2 PRODUCTS

2.1 MATERIALS

A. Basis of Design:
   1. **Kawneer Trifab 451/451T** (Product Evaluation CWSF-34), And/or the **Trifab 601/601T**, impact resistant system, maximum design pressure +/- 45 psf. Refer to Drawings for frame size and locations. Subject to compliance with requirements, provide comparable storefront system by one of the following:
      a. Tubelite, Inc.
      b. US Aluminum Corporation.
      c. Vistawall.
      d. YKK America AP, Inc.

B. Aluminum:
   1. Alloy and temper recommended by manufacturer for type of use and finish indicated:
      a. Sheet and plate: ASTM B209ASTM B209M.
      b. Extruded bars, rods, profiles, and tubes: ASTM B221ASTM B221M.
      c. Extruded structural pipe and tubes: ASTM B429.

C. Framing Members:
   1. Extruded aluminum framing members of thickness required and reinforced necessary to support imposed loads:
      a. Construction: Nonthermal/thermal.
      b. Glazing system: Retained mechanically with gaskets on four sides.
      c. Glazing plane: Center.

D. Accessories:
   1. Brackets and reinforcements: High strength aluminum with nonstaining, nonferrous shims for aligning system components.
   2. Fasteners and accessories:
      a. Corrosion resistant, nonstaining, nonbleeding fasteners and accessories compatible with adjacent materials:
         1) Use self-locking devices where fasteners are subject to loosening or turning out from thermal and structural movements, wind loads, or vibration.
         2) Reinforce members as required to receive fastener threads.
   3. Concrete and masonry inserts: Hot dip galvanized cast iron, malleable iron, or steel inserts, complying with ASTM A123/A123M or ASTM A153/A153M.
   4. Concealed flashing: Corrosion resistant, nonstaining, nonbleeding flashing compatible with adjacent materials.
   5. Framing system gaskets and sealants: Recommended by manufacturer for joint type.

E. Glazing:
   1. Refer to Section 08 80 00: Glazing for impact resistant laminated insulating glass with low-e coating on Number 2 surface:
      a. Glazing gaskets: Compression types; replaceable, molded or extruded, of profile and hardness required to maintain watertight seal.
      b. Spacers and setting blocks: Elastomeric type.

F. Entrance Doors:

1. Glazed entrance doors for manual swing operation:
   a. Door construction: 1-3/4-inch (44.5 mm) overall thickness, with minimum 0.125-inch (3.2 mm) thick, extruded aluminum tubular rail and stile members. Mechanically fasten corners with reinforcing brackets that are deeply penetrated and fillet welded or that incorporate concealed tie rods.
   b. Door design:
      1) Wide stile; 5-1/2-inch (88.9 mm) nominal width:
         a) Accessible doors: Smooth surfaced for width of door in area within ten inches (255 mm) above floor or ground plane.
   c. Glazing stops and gaskets: Square, snap on, extruded aluminum stops and preformed gaskets.

G. Entrance Door Hardware:
1. Refer to Section 08 71 00: Door Hardware for aluminum entrance hardware sets:
   a. Provide entrance door hardware and entrance door hardware sets indicated in door and frame schedule for each entrance door to comply with requirements in this Section:
      1) Opening-force requirements: CBC Section 11B-404.2.9:
         a) Exterior/interior hinged doors, sliding doors, or folding doors: Five (5) pounds square foot maximum.
         b) Required fire doors: The minimum opening force allowable by DSA not to exceed 15 pounds square foot (these forces do not apply to the force required to retract latch bolts or disengage other devices that hold the door in a closed position).
         c) Accessible interior doors: Maximum five (5) pounds foot to fully open door.
      2) Weather stripping: Standard replaceable components to match existing.
      3) Weather sweeps: Standard exterior door bottom sweep with exposed fasteners on mounting strip to match existing.

H. Accessories:
1. Joint sealants: For installation at perimeter of aluminum framed systems, refer to Section 07 92 00: Joint Sealants.
2. Bituminous paint: Cold applied, asphalt mastic paint complying with SSPC-Paint 12 requirements except containing no asbestos; formulated for 30 mil 0.762 mm thickness per coat.

2.2 FABRICATION

A. Form or extrude aluminum shapes before finishing.

B. Framing Members:
1. Fabricate components that, when assembled, have specified characteristics:
   a. Profiles that are sharp, straight, and free of defects or deformations.
   b. Accurately fitted joints with ends coped or mitered.
   c. Means to drain water passing joints, condensation within framing members, and moisture migrating within the system to exterior.
   d. Physical and thermal isolation of glazing from framing members.
   e. Accommodations for thermal and mechanical movements of glazing and framing to maintain required glazing edge clearances.
   f. Provisions for field replacement of glazing from interior for vision glass and exterior for spandrel glazing or metal panels.
   g. Fasteners, anchors, and connection devices that are concealed from view to greatest extent possible.
   h. Provide sill receptors with end dams at all sill conditions.

C. Mechanically Glazed Framing Members: Fabricate for flush glazing without projecting stops.

D. Storefront Framing: Fabricate components for assembly using screw spline system.

E. Entrance Door Frames:
   1. Reinforce as required to support loads imposed by door operation and for installing entrance door hardware:
      a. At exterior doors, provide weather stripping at fixed stops.
      b. At interior doors, provide weather stripping at stops to prevent metal to metal contact.

F. Entrance Doors:
   1. Reinforce doors as required for installing entrance door hardware:
      a. At pairs of exterior doors, provide compression type weather stripping retained in adjustable strip and mortised into door edge.
      b. At exterior doors, provide weather sweeps applied to door bottoms.

G. After fabrication, clearly mark components to identify their locations in Project according to shop drawings.

2.3 ALUMINUM FINISHES

A. Class I, Clear Anodic Finish (#14): AA-M10C21A41 / AA-M45C22A41, 0.018 mm or thicker.

PART 3 EXECUTION

3.1 PROJECT CONDITIONS

A. Field Measurements: Verify actual locations of structural supports for aluminum framed systems by field measurements before fabrication and indicate measurements on shop drawings.

3.2 EXAMINATION

A. Examine areas and conditions for compliance with requirements for installation tolerances and conditions affecting performance of the work. Proceed with installation after correcting unsatisfactory conditions.

3.3 INSTALLATION

A. Comply with aluminum framed storefront manufacturer recommended installation instructions. Coordinate installation with curtain wall work:
   1. Do not install damaged components.
   2. Fit joints to produce hairline joints free of burrs and distortion.
   3. Rigidly secure nonmovement joints.
   4. Install anchors with separators and isolators to prevent metal corrosion and electrolytic deterioration.
   5. Seal joints watertight unless otherwise indicated.
   6. Min anchorage #8 with two-inch (2”) minimum embedment; minimum two inches (2”) from edges. Refer to shop drawings.

B. Metal Protection:
   1. Where aluminum will contact dissimilar metals, protect against galvanic action by painting contact surfaces with primer or applying sealant or tape, or by installing nonconductive spacers as recommended by manufacturer for this purpose.

2. Where aluminum will contact concrete or masonry, protect against corrosion by painting contact surfaces with bituminous paint.

C. Install components to drain water passing joints, condensation occurring within framing members, and moisture migrating within the system to exterior.

D. Set continuous sill members and flashing in full sealant bed as specified in Section 07 92 00: Joint Sealants to produce weathertight installation.

E. Install components plumb and true in alignment with established lines and grades, and without warp or rack.

F. Install glazing specified in Section 08 80 00: Glazing.

G. Entrance Doors and Hardware:
1. Install doors to produce smooth operation and tight fit at contact points:
a. Exterior doors: Install to produce weathertight enclosure and tight fit at weather stripping.
b. Field installed entrance door hardware: Install surface mounted entrance door hardware according to entrance door hardware manufacturers' written instructions using concealed fasteners to greatest extent possible.

H. Install perimeter joint sealants as specified in Section 07 92 00: Joint Sealants to produce weathertight installation.

3.4 ERECTION TOLERANCES

A. Install aluminum framed systems to comply with the following maximum erection tolerances:
1. Location and plane: Limit variation from true location and plane to 1/8 inch in 12 feet (3 mm in 3.7 m); 1/4 inch (6 mm) over total length.
2. Alignment:
a. Where surfaces abut in line, limit offset from true alignment to 1/16 inch (1.5 mm).
b. Where surfaces meet at corners, limit offset from true alignment to 1/32 inch (0.8 mm).

B. Diagonal Measurements: Limit difference between diagonal measurements to 1/8 inch (3 mm).

3.5 ADJUSTING

A. Adjust operating entrance door hardware to function smoothly as recommended by manufacturer:
1. For entrance doors accessible to people with disabilities, adjust closers to provide a three (3) second closer sweep period for doors to move from a 70-degree open position to three inches (75 mm) from the latch, measured to the leading door edge.

3.6 MAINTENANCE SERVICE

A. Entrance Door Hardware:
1. Maintenance tools and instructions: Furnish a complete set of specialized tools and maintenance instructions as needed for Owner's continued adjustment, maintenance, and removal and replacement of entrance door hardware.
2. Initial maintenance service: Beginning at Substantial Completion, provide six (6) months full maintenance by skilled employees of entrance door hardware installer.

Include quarterly preventive maintenance, repair, or replacement of worn or defective components, lubrication, cleaning, and adjusting as required for proper entrance door hardware operation at rated speed and capacity. Provide parts and supplies the same as those used in the manufacture and installation of original equipment.

END OF SECTION 08 41 13

SECTION 08 51 13 ALUMINUM WINDOWS

PART 1 GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. This section specifies architectural aluminum type windows with integral glazing units and accessories.

B. Related Sections:
1. Section 01 33 00: Submittal Procedures.
2. Section 01 60 00: Product Requirements.
3. Section 07 92 00: Joint Sealants.
4. Section 08 80 00: Glazing.

C. Reference Standards:
1. American Architectural Manufacturer's Association (AAMA):
   a. AAMA/WDMA/CSA101/I.S.2/A440 North American Fenestration Standard/Specification for Windows, Doors, and Skylights, Includes Update No. 1.
   b. AAMA 502 Voluntary Specification for Field Testing of Newly Installed Fenestration Products.
   c. AAMA 609 Cleaning and Maintenance Guide for Architecturally Finished Aluminum.
   d. AAMA 611 Voluntary Standards for Anodized Architectural Aluminum.
   e. AAMA 2605 Voluntary Specification, Performance Requirements and Test Procedures for Superior Performing Organic
2. Glass Association of North America (GANA):
   a. GANA 01-0300 Proper Procedures for Cleaning Architectural Glass Products.
3. ASTM International (ASTM):
   a. ASTM E283 Standard Test Method for Determining Rate of Air Leakage Through Exterior Windows, Curtain Walls, and Doors Under Specified Pressure Differences Across the Specimen.
   b. ASTM E330 Standard Test Method for Structural Performance of Exterior Windows, Doors, Skylights and Curtain Walls by Uniform Static Air Pressure Difference.
   c. ASTM E547 Standard Test Method for Water Penetration of Exterior Windows, Skylights, Doors, and Curtain Walls by Cyclic Static Air Pressure Difference.
   d. ASTM F588 Standard Test Methods for Measuring the Forced Entry Resistance of Window Assemblies, Excluding Glazing Impact.
4. National Fenestration Rating Council (NFRC):
   a. NFRC 100A Procedure for Determining Fenestration Attachment Product U-Factors.
   b. NFRC 200A Procedure for Determining Attachment Product Solar Heat Gain Coefficient and Visible Transmittance at Normal Incidence.
   c. NFRC 500 Procedure for Determining Fenestration Product Condensation Resistance Values.

1.3 SUBMITTALS

A. Product Data - Manufacturer's standard specifications and descriptive literature, including:

1. Certified test laboratory reports to show compliance with requirements:
   a. Windows with sizes exceeding the gateway sizes do not qualify under these tests.
   b. Windows manufactured with configurations different than the tested configurations do not qualify under these tests; windows can be tested for performance outside the already tested gateway sizes.
   c. Windows with hardware different from what is referenced on the test reports do not qualify under these tests.
2. Manufacturer's standard head, jamb, and sill details.
3. Installation methods.

B. Manufacturer's Certificates: Submit certified independent testing agency reports indicating window unit meets or exceeds specified performance requirements.

C. Shop Drawings - For each installation and for special components not dimensioned or detailed in manufacturer's product data:
1. Provide shop drawings indicating details of construction and installation including, but not limited to, window location chart, window schedule, size, muntin type and design, sections and details of multiple window assemblies, hardware, glazing details, frame type, STC, glass types, screens, and handing operation.

D. Samples:
1. Window Section:
   a. Submit eight-inch by eight-inch (8" × 8") minimum corner section sample of frame for each glazing type specified.
   b. Sample will be used to verify construction, corner joint, frame finish and color.
   c. Quantity 1.
2. Glazing:
   a. Insulated glazing: 12 × 12 inch.
3. Finish - AAMA 611 Anodized Architectural Coatings; AAMA 2605 for Organic Coatings on Aluminum Extrusions:
   b. [Kynar].

E. Manufacturer's written instructions, including:
1. Delivery, storage, and handling recommendations.
2. Preparation and installation recommendations.

F. Installer's Experience: Submit verification of evidence of work similar to work of this Section.

G. Warranty:
1. Fully executed, issued in Owner's name and registered with manufacturer, including:
   a. Manufacturer's 2-year warranty, from date of accepted delivery, covering defects in materials.

1.4 PERFORMANCE REQUIREMENTS

A. Design pressure, air infiltration, and water penetration:
1. Comply with AAMA /WDMA/CSA 101/I.S.2/A440 AW-PG80.

B. Uniform Load Deflection and Uniform Load Structural to ASTM E330.

C. ASTM E283, Air Leakage: 6.27 psf: 0.1 cfm/ft2 maximum.

D. ASTM E547, Water Penetration: at 12.11 psf: No leakage.

E. ASTM F588, Forced Entry Resistance: Type B grade 10: pass for no entry.

1.5 QUALITY ASSURANCE

A. Manufacturer Qualifications - Minimum ten (10) years' experience in producing aluminum windows of the type specified:
   1. Manufacturer must be certified through the PPG Certified Window Fabricator Program.

B. Installer Qualifications: Licensed contractor with a minimum three (3) years' experience installing similar windows.

C. Mockups:
   1. Provide and install at jobsite a mockup using acceptable products and manufacturer approved installation methods. Obtain Owner's and Architect's acceptance of finish color and workmanship standard:
      a. Maintenance: Maintain mockup during construction for workmanship comparison; remove and legally dispose of mockup when no longer required.
      b. Incorporation:
         1) Mockup may be incorporated into final construction upon Owner's and Architect's approval.
      c. Modify mockup as required to produce acceptable work.

D. Source Quality Control:
   1. Use only fabricators who have training and experience with similar work of this Section.
   2. Ensure all window framing materials come from single manufacturer.

E. Field Quality Control:
   1. Comply with AAMA 502.
   2. Field testing performance: To AAMA 502.
   3. Proper execution of the field test:
      a. Ensure window is plumb, level, and square:
         1) If conditions fall outside the +/-1/8-inch tolerance, do not test product.
         2) Test at a pressure greater than 2/3 the fenestration product laboratory test pressure.
   4. Qualification of the agency performing the test: Ensure agency is an AAMA accredited independent testing agency.
   5. Site visits:
      a. Schedule site visits to review work at stages listed:
         1) After delivery and storage of aluminum windows and when preparatory work on which work of this Section depends is complete, but before application begins.
         2) Twice during progress of work at 25 percent and 60 percent complete.
         3) Upon completion of work, after cleaning is carried out.
         4) Obtain reports within three (3) days of review and submit immediately to Architect.

1.6 WARRANTY

A. Manufacturer's warranty:
   1. Submit, for Owner's acceptance, manufacturer's standard warranty document executed by authorized company official.
   2. Manufacturer's warranty is in addition to and not intended to limit other rights Owner may have under Contract Conditions.

1.7 DELIVERY, STORAGE, AND HANDLING

A. Delivery:

1. Deliver materials in accordance with manufacturer's written instructions and labeling.
2. Deliver materials in manufacturer's original, unopened, undamaged containers or packaged with identification labels intact, and product name and manufacturer clearly visible and in sizes to suit Project.

B. Storage:
1. Store materials upright and protected from exposure to harmful environmental conditions, clean, dry, frost-free and at manufacturer's recommended temperature and humidity levels.

C. Handling:
1. Exercise care during off-loading and installation to avoid damage and marring of finishes.
2. Handle in a manner to evenly distribute material load and prevent twisting, ending, and cracking of windows doors and associated parts.
3. Replace materials damaged during handling.

PART 2 PRODUCTS

2.1 MANUFACTURER

A. Acceptable Manufacturer: All Weather Architectural Aluminum, 777 Aldridge Road, Vacaville, California 95688; Phone: (707) 452-1600; Fax: (707) 452-1616; Email: randy.agno@allweatheraa.com; Website: www.allweatheraa.com.

B. Basis for Design: Series 6000 Windows by All Weather Architectural Aluminum.

C. Information, including sample (size and configuration per Architect's requirements) must be submitted for consideration a minimum of ten (10) days before Project bid date.

2.2 DESCRIPTION

A. Acceptable Material - Series 6000 Outside Glazed Windows by All Weather Architectural Aluminum:
1. Aluminum framed fixed, double hung windows as indicated on plan with insulating glazing units (IGU) and accessories.
2. Window dimensions:
   a. See Drawings for window types and configurations.

2.3 MATERIALS

A. Frames – 2-1/2 inches thermal strut, outside glazed, thermally broken extruded aluminum, Type 6063 age hardened to T-6 rating for strength and durability:
1. Include full perimeter exterior snap in glazing stops.
2. Corners of frame and ventilators: Mitered, corner keyed and crimped; muntin and intermediate bars attached to cross joints and abutting sash sections.
3. Finish types:
   a. 70% Kynar paint color selected by Architect from manufacturer's standard range.

B. Glazing:
1. Single 1/2 inch.
2. Insulated Glass 1 inch.
3. Reference Specification 08 80 00

2.4 FABRICATION

A. Mitered, corner keyed, and crimped on frames and ventilators.

B. Attach muntin and intermediate bars to cross joints and abutting sections.

C. Ensure sill, vents, and intermediate bars have weep holes and are sloped for positive drainage to exterior.

D. Pre-drill and tap frames to receive screen attachment hardware as required.

E. Ensure surfaces to be glazed include bead retaining notch.

F. Ensure operable windows include two (2) rows of weatherstripping in extruded slot at perimeter of vent or opening.

G. Install hardware specified.

2.5 ACCESSORIES

A. Screens - Painted roll formed aluminum frames finished to match window frames, factory-drilled/tapped to receive screen attachment hardware:
   1. Screen hardware:
      a. Charcoal fiberglass.
      b. Wire.
      c. Ultraview™.
      d. Plastic wicket doors.

B. Weatherstripping: 64A durometer black santoprene bulb insert.

PART 3 EXECUTION

3.1 EXAMINATION

A. Verification of Conditions:
   1. Verify that conditions of substrate previously installed under other Sections or contracts are acceptable for aluminum window installation in accordance with manufacturer's written recommendations:
      a. Visually inspect substrate.
      b. Verify openings are dimensionally correct and within allowable tolerances, and substrates are plumb, level, and clean.
      c. Verify in the presence of the Architect that anchoring surface is in accordance with approved shop drawings.
      d. Inform Architect of unacceptable conditions immediately upon discovery.
      e. Proceed with installation only after unacceptable conditions have been remedied and after receipt of written approval to proceed from Architect.
      f. Starting window installation implies substrate conditions are acceptable for work of this Section.

3.2 INSTALLATION

A. Install aluminum windows in accordance with manufacturer's written recommendations:
   1. Ensure operable windows are closed and locked during installation.

3.3 SEALANTS

A. Apply sealant in accordance with manufacturer's written installation guidelines.

3.4 CLEANING

A. Clean sealants, caulking, and other materials from surfaces, including adjacent work.

B. Clean window frames, casings, and glass using materials and methods recommended by the window and glass manufacturer that do not cause defacement of work:
   1. Clean using methods that comply with AAMA 609.
   2. Clean glass using methods that comply with GANA 01-0300.

C. Protect installed products until completion of Project.

D. Touch-up, repair, or replace damaged products before Substantial Completion.

3.5 PROTECTION

A. Protect installed aluminum windows from damage during construction.

B. Repair or replace adjacent materials damaged by installation of aluminum windows.

END OF SECTION 08 51 13

SECTION 08 62 23 TUBULAR DAYLIGHTING DEVICES

PART 1 GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section includes tubular daylighting devices and accessories.

B. Related Sections:
1. Section 05 50 00: Metal Fabrications.
2. Section 06 10 00: Rough Carpentry.
3. Section 07 54 19: PVC Thermoplastic Membrane Roofing.
4. Section 07 62 00: Sheet Metal Flashing and Trim.
5. Section 07 92 00: Joint Sealants.
6. Division 23: Heating, Ventilating & Air Conditioning (HVAC).
7. Division 26: Electrical.

C. Reference Standards – Refer to current edition of all references:
1. AAMA/WDMA/CSA 101/I.S.2/A440 Standard/Specification for Windows, Doors, and Unit Skylights.
2. ASTM References:
   a. ASTM A463/A463M Standard Specification for Steel Sheet, Aluminum Coated, by the Hot Dip Process.
   b. ASTM A653/A653M Standard Specification for Steel Sheet, Zinc Coated (Galvanized), by the Hot Dip Process.
   c. ASTM A792/A792M Standard Specification for Steel Sheet, 55% Aluminum-Zinc Alloy-Coated by the Hot-Dip Process.
   d. ASTM B209 Standard Specification for Aluminum and Aluminum-Alloy Sheet and Plate.
   e. ASTM D635 Test Method for Rate of Burning and/or Extent of Time of Burning of Self-Supporting Plastics in a Horizontal Position.
   f. ASTM D1929 Test Method for Ignition Properties of Plastics.
   g. ASTM D2843 Standard Test Method for Density of Smoke from the Burning or Decomposition of Plastics.
   h. ASTM E84 Standard Test Method for Surface Burning Characteristics of Building Materials.
   i. ASTM E108 Standard Test Methods for Fire Tests of Roof Coverings.
   j. ASTM E283 Test Method for Rate of Air Leakage Through Exterior Windows, Curtain Walls, and Doors Under Specified Pressure Differences Across the Specimen.
   k. ASTM E308 Standard Practice for Computing the Colors of Objects by Using the CIE System.
   l. ASTM E330 Structural Performance of Exterior Windows, Curtain Walls and Doors.
   m. ASTM E547 Test Method for Water Penetration of Exterior Windows, Skylights, Doors and Curtain walls by Cyclic Air Pressure Difference.
   n. ASTM E1886 Standard Test Method for Performance of Exterior Windows, Curtain Walls, Doors, and Impact Protective Systems Impacted by Missile(s) and Exposed to Cyclic Pressure Differentials.
   o. ASTM E1996 Standard Specification for Performance of Exterior Windows, Curtain Walls, Doors, and Impact Protective Systems Impacted by Windborne Debris in

Hurricane.
p. ASTM F1642 Standard Test Method for Glazing and Glazing Systems Subject to Airblast Loading.
q. ASTM F2912 Standard Specification for Glazing and Glazing Systems Subject to Airblast Loading.
3. California State OSHA Fall Protection Code of Regulations, Title 8, Section 3212 (e)(1).
4. FM Standard 4431 The Approval Standard for Skylights.
5. ICC-ES AC16 Acceptance Criteria for Plastic Skylights.
6. OSHA 29 CFR - 1910.23 (e)(8) (Guarding Requirements for Skylights); 1926 Subpart M (Fall Protection); 1926.501(b)(4)(i); 1926.501(i)(2); 1926.501(b)(4)(ii).
7. UL 2108 Low Voltage Lighting Systems.
8. Unified Facilities Criteria (UFC) 4-010-01 DoD Minimum Antiterrorism Standards for Buildings.

1.3 SUBMITTALS

A. Submit under provisions of Section 01 33 00: Submittal Procedures.

B. Product Data:
1. Manufacturer's data sheets on each product to be used, including:
a. Preparation instructions and recommendations.
b. Storage and handling requirements and recommendations.
c. Data sheets showing roof dome assembly, flashing base, reflective tubes, diffuser assembly, and accessories.
d. Installation requirements.

C. Shop Drawings. Submit shop drawings showing layout, profiles, and product components, including rough opening and framing dimensions, anchorage, roof flashings, and accessories.

D. Electrical wiring diagrams and recommendations for power and control wiring.

E. Verification Samples: As requested by Architect.

F. Test Reports: Independent testing agency or evaluation service reports verifying compliance with specified performance requirements.

1.4 PERFORMANCE REQUIREMENTS

A. Fire Testing:
1. Fire rated roof assemblies: When used with the Dome Edge Protection Band, all domes meet fire rating requirements as described in the International Building Code for Class A, B, and C roof assemblies.
2. When used with the Dome Edge Protection Band, all domes meet fire rating requirements as described in the International Building Code.
3. Self-ignition temperature - greater than 650 degrees F per ASTM D1929.
4. Smoke density: Rating no greater than 450 per ASTM E84 in way intended for use. Classification C.
5. Rate of burn and/or extent:
a. Maximum burning rate: 2.5 inches/min (62 mm/min). Classification CC-2 per ASTM D635.
6. Rate of burn and/or extent:
a. Maximum burn extent: One inch (25 mm). Classification CC-1 per ASTM D635.
7. Fall protection performance:

a. Passes fall protection test: No penetration of dome or curb cap when subject to 400 pounds (160 Kg) / 42-inch (1066 mm) impact drop test when tested in accordance with OSHA 29 CFR 1926.506(c) Safety Net Systems.
b. Passes fall protection test: California State OSHA Fall Protection Code of Regulations, Title 8, Section 3212 (e)(1) Skylight Screens.

8. Blast resistance - ASTM F1642, ASTM F2912, and UFC 4-010-01:
   a. Airblast loading ASTM hazard rating: Passes - no hazard rating.
   b. Airblast loading UFC level of protection: Passes medium level of protection.
   c. Dynamic overpressure loading ASTM hazard rating: Passes - no hazard rating.
   d. Dynamic overpressure loading UFC level of protection: Passes medium level of protection.

1.5 QUALITY ASSURANCE

A. Manufacturer Qualifications: Engaged in manufacture of tubular daylighting devices for minimum 20 years.

1.6 WARRANTY

A. Daylighting Device: Manufacturer's standard warranty for ten (10) years.

B. Electrical Parts: Manufacturer's standard warranty for five (5) years, unless otherwise indicated.

C. LED Emitters, Drivers, and Controls: Manufacturer's standard warranty for three (3) years against failure.

1.7 DELIVERY, STORAGE, AND HANDLING

A. Deliver products in manufacturer's original containers, dry, undamaged, and with seals and labels intact.

B. Store products in manufacturer's unopened packaging until ready for installation.

PART 2 PRODUCTS

2.1 MANUFACTURERS

A. Basis of Design: Solatube International, Inc., which is located at: Solatube International 2210 Oak Ridge Way; Vista, CA 92081-8341; Toll Free Tel: 888-765-2882; Tel: 760-477-1120; Fax: 760-597-4488; Email:Howard Holko; hholko@solatube.com or at 415-847-1802.

B. Requests for substitutions will be considered in accordance with provisions of Section 01 60 00: Product Requirements.

2.2 TUBULAR DAYLIGHTING DEVICES

A. Tubular Daylighting Devices, General: Transparent roof-mounted skylight dome and self-flashing curb, reflective tube, and ceiling level diffuser assembly, transferring sunlight to interior spaces; complying with ICC AC16.

B. SolaMaster Series - Solatube Model 750 DS, 21-inch (530 mm) Daylighting System:
   1. Model: Solatube Model 750 DS-C Closed (Penetrating) Ceiling. AAMA Type TDDCC.
   2. Capture zone:
      a. Roof dome assembly: Transparent, UV and impact resistant dome with flashing

base supporting dome and top of tube.
1) Outer dome glazing: Type DA, 0.125-inch (3.2 mm) minimum thickness injection molded acrylic classified as CC2 material; UV inhibiting (100 percent UV C, 100 percent UV B and 98.5 percent UV A), impact modified acrylic blend:
a) Raybender 3000: Variable prism optic molded into outer dome to capture low angle sunlight and limit high angle sunlight.
2) Acrylic dome plus inner dome glazing: Type DAI, inner dome is 0.115-inch (3 mm) minimum thickness acrylic classified as CC2 material.

b. Tube ring:
1) 0.090-inch (2.3 mm) nominal thickness injection molded high impact PVC. Prevents thermal bridging between base flashing and tubing and channel condensed moisture. Attached to base of dome ring with butyl glazing rope 0.24-inch (6 mm) diameter; to minimize air infiltration.

c. Dome seal: Adhesive backed weather strip, 0.63-inch (16 mm) tall by 0.28-inch (7 mm) wide.

3. Dome options:
a. Security bar: Type B security bar 0.375-inch (95 mm) stainless steel bar across flashing diameter opening.
b. Dome edge protection band for curb cap: Type PBC, for fire rated Class A, B, or C roof applications with 750 DS Domes on curb cap flashing installations. Galvanized steel. Nominal thickness of 0.039-inch (1 mm). For use with curb cap flashing (Type FC) only.

4. Flashings:
a. One-piece: One-piece, seamless, leak-proof flashing functioning as base support for dome and top of tube. Sheet steel, corrosion resistant conforming to ASTM A653/A653M or ASTM A463/A463M or ASTM A792/A792M, 0.028 inch (0.7 mm) plus or minus .006-inch (.015 mm) thick.
b. Base style: Type FC, curb cap, with inside dimensions of 27 inches by 27 inches (685 mm by 685 mm) to cover curb as specified in Section 07 62 00: Joint Sealants.

5. Transfer zone:
a. Extension tubes - aluminum sheet, thickness 0.018 inch (0.5 mm) conforming to ASTM B209.
1) Reflective tubes:
a) Reflective extension tube, Type EXX and Type EL with total length of run as indicated on the Drawings.
b) Interior finish: Spectralight Infinity with INFRAREDuction Technology combining ultra-high visible light reflectance with ultra-low infrared (IR) reflectance.
2) Tube options:
a) Top tube angle adapter and bottom tube angle adapter kit: Type AK, Reflective 45-degree adjustable top and bottom angle adapters (one each), 16 inches (406 mm) long
b) Bottom tube angle adapter, Type BA: Reflective 45-degree adjustable bottom tube angle adapter, 16 inches (406 mm) long.
c) Wire suspension kit: Type E. Use the wire suspension kit when additional bracing to the structure is required.

6. Delivery zone:
a. Diffuser assemblies for tubes penetrating ceilings:
1) Solatube Model 750 DS-C. Ceiling mounted box transitioning from round tube to square ceiling assembly, supporting light transmitting surface at bottom termination of tube; 23.8 inches by 23.8 inches (605 mm by 605 mm) square frame to fit standard suspended ceiling grids or hard ceilings.
a) Metal transition box: Type TM, metal round to square transition box comprised of Spectralight Infinity SoftLight material with structured finish

on exposed reflective surface, .015-inch (0.4 mm) thick. Color: a* and b* (defined by CIE L*a*b* color model) shall not exceed plus two (2) or be less than minus two (2) as determined in accordance to ASTM E308.

b) Lens for corridors only**:** Type L1, OptiView Fresnel lens design to maximize light output and diffusion with extruded aluminum frame and EPDM foam seal to minimize condensation and bug, dirt, and air infiltration per ASTM E283. Visible light transmission shall be greater than 90 percent at 0.022-inch (0.6 mm) thick. Classified as CC2.

c) Lens for all other rooms: Type L2, prismatic lens design to maximize light output and diffusion with extruded aluminum frame and EPDM foam seal to minimize condensation and bug, dirt and air infiltration per ASTM E283. Visible light transmission shall be greater than 90 percent at 0.100-inch (2.5 mm) thick. Classified as CC2.

b. Delivery zone options:

1) Local dimmer control utilizing a butterfly baffle design of Spectralight Infinity reflective material to minimize shadowing when in use; provided with dimmer switch and cable:

a) Daylight dimmer: Type D, electro-mechanically actuated daylight valve; for universal input voltages ranging between 90 and 277 V at 50 or 60 Hz; maximum current draw of 50 ma per unit; controlled by low voltage, series Type T02. Provided with dimmer switch and cable. Cable circuited, 4 conductor, size 22 AWG when total aggregate circuit runs are under 200 feet (60.96 m) or size 18 AWG when total aggregate circuit runs are under 500 feet (152.4 m); providing daylight output between two percent (2%) and 100 percent.

7. Accessories

a. Switch: Type SW, manufacturer-specific low voltage DC DP/DT switch (white) required to operate daylight dimmer. Note: only one switch is required per set of synchronously controlled dimmers. For use with daylight dimmer, Type D, only. Pre-wired with 30 feet (9.14 m) of 22 AWG, 4 conductor, low-voltage cable.

b. Cable: Type CA, optional two conductor, size 22 AWG, low voltage cable (500 foot) for multiple unit DC connection. For use with daylight dimmer, Type D, only, and when aggregate circuit runs do not exceed 200 feet (60.96 m).

C. Performance Requirements:

1. Daylight reflective tubes: Spectralight Infinity with INFRAREDuction Technology combines ultra-high visible light reflectance with ultra-low infrared (IR) reflectance. Patented spectrally-selective optical surface yields an average total and specular-reflectance greater than 99.5 percent for the visible light spectrum (400 nm to 700 nm) providing maximized visible light transmission and less than 25 percent reflectance for infrared (IR) heat wavelengths (750 nm to 2500 nm) for minimized heat transmission, resulting in a spectrally-selective total solar spectrum (250 nm to 2500 nm) reflectance less than 37 percent, as measured using a Perkin Elmer Lambda 1050 spectrophotometer with a Universal Reflectance Accessory. Color: a* and b* (defined by CIE L*a*b* color model) shall not exceed plus two (2) or be less than minus two (2) as determined in accordance to ASTM E308.

2. SOLAMASTER 750 DS-O / 750 DS-C (Open/Closed Ceiling):

a. AAMA/WDMA/CSA 101/IS2/A440, Class CW-PG70, size tested 21-inch (533 mm) diameter, Type TDDOC and Type TDDCC:

1) Air infiltration test:

a) Air infiltration will not exceed 0.30 cfm/sf aperture with a pressure delta of 1.57 psf across the tube when tested in accordance with ASTM E283.

2) Water resistance test: Passes water resistance; no uncontrolled water leakage with a pressure differential of 10.7 psf (512 Pa) or 15 percent of the design load (whichever is greater) and a water spray rate of five (5) gallons/hour/sf for 24 minutes when tested in accordance with ASTM E547

and ASTM E331.

3) Uniform load test:
   a) All units tested with a safety factor of three (3) for positive pressure and two (2) for negative pressure, acting normal to plane of roof in accordance with ASTM E330.
   b) No breakage, permanent damage to fasteners, hardware parts, or damage to make daylighting system inoperable or cause excessive permanent deflection of any section when tested at a positive load of 150 psf (7.18 kPa) or negative load of 70 psf (3.35 kPa).

2.3 ACCESSORIES

A. Fasteners: Same material as metals being fastened, non-magnetic steel, non-corrosive metal of type recommended by manufacturer, or injection molded nylon.

B. Suspension Wire: Steel, annealed, galvanized finish, size and type for application and ceiling system requirement.

C. Sealant: Polyurethane or copolymer based elastomeric sealant as provided or recommended by manufacturer.

PART 3 EXECUTION

3.1 PROJECT CONDITIONS

A. Maintain environmental conditions (temperature, humidity, and ventilation) within limits recommended by manufacturer for optimum results. Do not install products under environmental conditions outside manufacturer's absolute limits.

3.2 EXAMINATION

A. Do not begin installation until substrates have been properly prepared.

B. Examine openings, substrates, structural support, anchorage, and conditions for compliance with requirements for installation tolerances and other conditions.

C. If substrate and rough opening preparation is the responsibility of another installer, notify Architect of unsatisfactory preparation before proceeding.

3.3 PREPARATION

A. Clean surfaces thoroughly prior to installation.

B. Coordinate requirements for power supply, conduit, and wiring.

C. Prepare surfaces using the methods recommended by the manufacturer for achieving the best result for the substrate under the Project conditions.

3.4 INSTALLATION

A. Install in accordance with manufacturer's printed instructions.

B. Coordinate installation with substrates, air and vapor retarders, roof insulation, roofing membrane, and flashing to ensure that each element of the work performs properly, and that finished installation is weather tight:

1. Install flashing to produce weatherproof seal with curb and overlap with roofing system termination at top of curb.
2. Provide thermal isolation when components penetrate or disrupt building insulation. Pack fibrous insulation in rough opening to maintain continuity of thermal barriers.
3. Coordinate attachment and seal of perimeter air and vapor barrier material.

C. Where metal surfaces of tubular unit skylights will contact incompatible metal or corrosive substrates, including preservative-treated wood, provide permanent separation as recommended by manufacturer

D. Align device free of warp or twist, maintain dimensional tolerances.

E. After installation of first unit, field test to determine adequacy of installation. Conduct water test in presence of Owner, Architect, or Contractor, or their designated representative. Correct if needed before proceeding with installation of subsequent units.

F. Inspect installation to verify secure and proper mounting. Test each fixture to verify operation, control functions, and performance. Correct deficiencies.

3.5 CLEANING

A. Clean exposed surfaces according to manufacturer's written instructions. Touch up damaged metal coatings and finishes. Remove excess sealants, glazing materials, dirt, and other substances.

3.6 PROTECTION

A. Protect installed products until completion of Project.

B. Touch-up, repair, or replace damaged products before Substantial Completion.

END OF SECTION 08 62 23

SECTION 08 71 00 - DOOR HARDWARE

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

1.2 SUMMARY

A. This Section includes commercial door hardware for the following:

1. Swinging doors.
2. Sliding doors.
3. Other doors to the extent indicated.

B. Door hardware includes, but is not necessarily limited to, the following:

1. Mechanical door hardware.
2. Electromechanical door hardware.
3. Cylinders specified for doors in other sections.

C. Related Sections:

1. Division 01 Section "Sustainable Design Requirements".
2. Division 01 Section "General Conditions”.
3. Division 06 Section “Rough Carpentry”.
4. Division 06 Section “Finish Carpentry”.
5. Division 08 Section “Operations and Maintenance”.
6. Division 08 Section “Hollow Metal Doors and Frames”.
7. Division 08 Section “Flush Wood Doors”.
8. Division 08 Section "Wood Sliding Door Assemblies”.
9. Division 08 Section “Fiberglass Doors”,
10. Division 08 Section "Integrated Door Opening Assemblies”.
11. Division 08 Section "Radio-Frequency Interference Shielding Doors”.
12. Division 08 Section “Lead Lined Doors and Frames”.
13. Division 08 Section “Bullet Resistant Doors and Frame”.
14. Division 08 Section “Attack Resistant Doors and Frames.”
15. Division 08 Section “Forced Entry Doors and Frames”.
16. Division 08 Section “Metal Sound Control Hollow Door Assemblies”.
17. Division 08 Section “Wood Sound Control Door Assemblies”.
18. Division 08 Section “Wood Sliding Sound Control Door Assemblies.
19. Division 08 Section “Aluminum-Framed Entrances and Storefronts”.
20. Division 08 Section “Fire-Rated Steel Framed Entrances.”
21. Division 26 Section "Electrical”
22. Division 28 Section “Campus Integrated Access Control Hardware Devices”.
23. Division 28 Section “Multi-Family Access Control Hardware Devices”.
24. Division 28 Section “Intercom Entry Systems”.

D. Codes and References: Comply with the version adopted by the Authority Having Jurisdiction.

1. ANSI A117.1 - Accessible and Usable Buildings and Facilities.
2. ICC/IBC - International Building Code.
3. NFPA 70 - National Electrical Code.
4. NFPA 80 - Fire Doors and Windows.
5. NFPA 101 - Life Safety Code.
6. NFPA 105 - Installation of Smoke Door Assemblies.
7. State Building Codes, Local Amendments.

E. Standards: All hardware specified herein shall comply with the following industry standards as applicable. Any undated reference to a standard shall be interpreted as referring to the latest edition of that standard:

1. ANSI/BHMA Certified Product Standards - A156 Series.
2. UL10C - Positive Pressure Fire Tests of Door Assemblies.
3. ANSI/UL 294 - Access Control System Units.
4. UL 305 - Panic Hardware.
5. ANSI/UL 437- Key Locks.

F. Registrations: All hardware specified herein shall be registered with the following agencies, as applicable:

1. California State Fire Marshall.

1.3 SUBMITTALS

A. Product Data: Manufacturer's product data sheets including installation details, material descriptions, dimensions of individual components and profiles, operational descriptions and finishes.

B. Door Hardware Schedule: Prepared by or under the supervision of supplier, detailing, fabrication and assembly of door hardware, as well as procedures and diagrams. Coordinate the final Door Hardware Schedule with doors, frames, and related work to ensure proper size, thickness, hand, function, and finish of door hardware.

1. Format: Comply with scheduling sequence and vertical format in DHI's "Sequence and Format for the Hardware Schedule."
2. Organization: Organize the Door Hardware Schedule into door hardware sets indicating complete designations of every item required for each door or opening. Organize door hardware sets in same order as in the Door Hardware Sets at the end of Part 3. Submittals that do not follow the same format and order as the Door Hardware Sets will be rejected and subject to resubmission.
3. Content: Include the following information:

   a. Type, style, function, size, label, hand, and finish of each door hardware item.
   b. Manufacturer of each item.
   c. Fastenings and other pertinent information.
   d. Location of door hardware set, cross-referenced to Drawings, both on floor plans and in door and frame schedule.
   e. Explanation of abbreviations, symbols, and codes contained in schedule.
   f. Mounting locations for door hardware.
   g. Door and frame sizes and materials.
   h. Warranty information for each product.

4. Submittal Sequence: Submit the final Door Hardware Schedule at earliest possible date, particularly where approval of the Door Hardware Schedule must precede fabrication of other work that is critical in the Project construction schedule. Include Product Data, Samples, Shop Drawings of other work affected by door hardware, and other information essential to the coordinated review of the Door Hardware Schedule.

C. Shop Drawings: Details of electrified access control hardware indicating the following:

1. Wiring Diagrams: Upon receipt of approved schedules, submit detailed system wiring diagrams for power, signaling, monitoring, communication, and control of the access control system electrified hardware. Differentiate between manufacturer-installed and field-installed wiring. Include the following:

a. Elevation diagram of each unique access controlled opening showing location and interconnection of major system components with respect to their placement in the respective door openings.
b. Complete (risers, point-to-point) access control system block wiring diagrams.
c. Wiring instructions for each electronic component scheduled herein.

2. Electrical Coordination: Coordinate with related sections the voltages and wiring details required at electrically controlled and operated hardware openings.

D. Keying Schedule: After a keying meeting with the owner has taken place prepare a separate keying schedule detailing final instructions. Submit the keying schedule in electronic format. Include keying system explanation, door numbers, key set symbols, hardware set numbers and special instructions. Owner must approve submitted keying schedule prior to the ordering of permanent cylinders/cores.

E. Proof of Compliance: (California located Projects): Provide a list of product(s) containing chemicals known to cause cancer or reproductive toxicity as defined by the Office of Environmental Health Hazard Assessment (OEHHA) under Proposition 65 (CA Code of Regulations, Title 27, Section 27001). The list includes the specific chemical(s), if the chemical will be exposed to consumers, the means of warning, and an illustration of the label.

F. Informational Submittals:

1. Product Test Reports: Indicating compliance with cycle testing requirements, based on evaluation of comprehensive tests performed by manufacturer and witnessed by a qualified independent testing agency.

1.4 CLOSEOUT SUBMITTALS

A. Operating and Maintenance Manuals: Provide manufacturers operating and maintenance manuals for each item comprising the complete door hardware installation in quantity as required in Division 01, Closeout Procedures.

B. Project Record Documents: Provide record documentation of as-built door hardware sets in digital format (.pdf, .docx, .xlsx, .csv) and as required in Division 01, Project Record Documents.

1.5 QUALITY ASSURANCE

A. Manufacturers Qualifications: Engage qualified manufacturers with a minimum 5 years of documented experience in producing hardware and equipment similar to that indicated for this Project and that have a proven record of successful in-service performance.

B. Certified Products: Where specified, products must maintain a current listing in the Builders Hardware Manufacturers Association (BHMA) Certified Products Directory (CPD).

C. Installer Qualifications: A minimum 3 years documented experience installing both standard and electrified door hardware similar in material, design, and extent to that indicated for this Project and whose work has resulted in construction with a record of successful in-service performance.

D. Door Hardware Supplier Qualifications: Experienced commercial door hardware distributors with a minimum 5 years documented experience supplying both mechanical and electromechanical hardware installations comparable in material, design, and extent to that indicated for this Project. Supplier recognized as a factory direct distributor by the manufacturers of the primary materials with a warehousing facility in Project's vicinity. Supplier to have on staff a certified Architectural Hardware Consultant (AHC) available during the course of the Work to consult with Contractor, Architect, and Owner concerning both standard and electromechanical door hardware and keying.

E. Source Limitations: Obtain each type and variety of door hardware specified in this section from a single source unless otherwise indicated.

1. Electrified modifications or enhancements made to a source manufacturer's product line by a secondary or third party source will not be accepted.
2. Provide electromechanical door hardware from the same manufacturer as mechanical door hardware, unless otherwise indicated.

F. California Building Code: Provide hardware that complies with CBC Section 11B.

1. All openings as a part of an accessible route shall comply with CBC Section 11B-404.
2. The clear opening width for a door shall be 32” minimum. For a swinging door it shall be measured between the face of the door and the stop, with the door open 90 degrees. There shall be no projections into it below 34” and 4” maximum projections into it between 34” and 80” above the finish floor or ground. Door closers and stops shall be permitted to be 78” minimum above the finish floor or ground. CBC Section 11B-404.2.3.
3. Operable hardware on accessible doors shall comply with CBC Section 11B-309.4 and shall be operable with one hand and shall not require tight grasping, pinching, or twisting of the wrist. Operable parts of such hardware shall be 34” minimum and 44” maximum above finish floor or ground. Where sliding doors are in the fully open position, operating hardware shall be exposed and usable from both sides.
4. Hardware (including panic hardware) shall not be provided with “nightlatch” function for any accessible doors or gates unless the following conditions are met:

    a. Such hardware has a ‘dogging’ feature and is dogged during the time the facility is open.
    b. All ‘dogging’ operation is performed only by employees as their job function (non-public use).

5. The force for pushing or pulling open a door shall be in accordance with CBC Section 11B-404.2.9.

a. Interior hinged doors, sliding or folding doors, and exterior hinged doors: 5 pounds (22.2 N) maximum. Required fire doors: the minimum opening force allowable by the DSA authority, not to exceed 15 pounds (66.7N). These forces do not apply to the force required to retract latch bolts or disengage other devices that hold the door in a closed position.
b. The force required for activating any operable parts, such as lever hardware, or disengaging other devices shall be 5 pounds (22.2N) maximum to comply with CBC Section 11B-309.4.
c. The 5 pound (22.2 N) maximum force shall be validated for the size of the door used. The Building Materials Listing of the California State Fire Marshal shall indicate that the door hardware meets the 5 pound (22.2 N) force and shall also list the largest door that can be used.

6. Door closing speed shall comply with CBC Section 11B-404.2.8. Closers shall be adjusted so that the required time to move a door from an open position of 90 degrees to a position of 12 degrees from the latch is 5 seconds minimum. Spring hinges shall be adjusted so that the required time to move a door from an open position of 70 degrees to the closed position is 1.5 seconds minimum.
7. Floor stops shall not be located in the path of travel and 4” maximum from walls.
8. Thresholds shall comply with CBC Section 11B-404.2.5.

G. Each unit to bear third party permanent label indicating compliance with the referenced testing standards.

H. Keying Conference: Conduct conference to comply with requirements in Division 01 Section "Project Meetings." Keying conference to incorporate the following criteria into the final keying schedule document:

1. Function of building, purpose of each area and degree of security required.
2. Plans for existing and future key system expansion.
3. Requirements for key control storage and software.
4. Installation of permanent keys, cylinder cores and software.
5. Address and requirements for delivery of keys.

I. Pre-Submittal Conference: Conduct coordination conference in compliance with requirements in Division 01 Section "Project Meetings" with attendance by representatives of Supplier(s), Installer(s), and Contractor(s) to review proper methods and the procedures for receiving, handling, and installing door hardware.

1. Prior to installation of door hardware, conduct a project specific training meeting to instruct the installing contractors' personnel on the proper installation and adjustment of their respective products. Product training to be attended by installers of door hardware (including electromechanical hardware) for aluminum, hollow metal and wood doors. Training will include the use of installation manuals, hardware schedules, templates and physical product samples as required.
2. Inspect and discuss electrical roughing-in, power supply connections, and other preparatory work performed by other trades.
3. Review sequence of operation narratives for each unique access controlled opening.
4. Review and finalize construction schedule and verify availability of materials.
5. Review the required inspecting, testing, commissioning, and demonstration procedures

J. At completion of installation, provide written documentation that components were applied according to manufacturer's instructions and recommendations and according to approved schedule.

1.6 DELIVERY, STORAGE AND HANDLING

A. Inventory door hardware on receipt and provide secure lock-up and shelving for door hardware delivered to Project site. Do not store electronic access control hardware, software or accessories at Project site without prior authorization.

B. Tag each item or package separately with identification related to the final Door Hardware Schedule, and include basic installation instructions with each item or package.

C. Deliver, as applicable, permanent keys, cylinders, cores, access control credentials, software and related accessories directly to Owner via registered mail or overnight package service. Instructions for delivery to the Owner shall be established at the "Keying Conference".

1.7 COORDINATION

A. Templates: Obtain and distribute to the parties involved templates for doors, frames, and other work specified to be factory prepared for installing standard and electrified hardware. Check Shop Drawings of other work to confirm that adequate provisions are made for locating and installing hardware to comply with indicated requirements.

B. Door and Frame Preparation: Doors and corresponding frames are to be prepared, reinforced and pre-wired (if applicable) to receive the installation of the specified electrified, monitoring, signaling and access control system hardware without additional in-field modifications.

1.8 WARRANTY

A. General Warranty: Reference Division 01, General Requirements. Special warranties specified in this Article shall not deprive Owner of other rights Owner may have under other provisions of the Contract Documents and shall be in addition to, and run concurrent with, other warranties made by Contractor under requirements of the Contract Documents.

B. Warranty Period: Written warranty, executed by manufacturer(s), agreeing to repair or replace components of standard and electrified door hardware that fails in materials or workmanship within specified warranty period after final acceptance by the Owner. Failures include, but are not limited to, the following:

1. Structural failures including excessive deflection, cracking, or breakage.
2. Faulty operation of the hardware.
3. Deterioration of metals, metal finishes, and other materials beyond normal weathering.
4. Electrical component defects and failures within the systems operation.

C. Warranty Period: Unless otherwise indicated, warranty shall be one year from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 MATERIALS

A. Hardware shall not have any visible manufacturer names on exposed materials, except cylinders, when the door is in a closed position.

2.2 BUTT HINGES

A. Hinges: ANSI/BHMA A156.1 butt hinges with number of hinge knuckles and other options as specified in the Door Hardware Sets.

1. Quantity: Provide the following hinge quantity:

   a. Two Hinges: For doors with heights up to 60 inches.
   b. Three Hinges: For doors with heights 61 to 90 inches.
   c. Four Hinges: For doors with heights 91 to 120 inches.
   d. For doors with heights more than 120 inches, provide 4 hinges, plus 1 hinge for every 30 inches of door height greater than 120 inches.

2. Hinge Size: Provide the following, unless otherwise indicated, with hinge widths sized for door thickness and clearances required:

   a. Widths up to 3’0”: 4-1/2” standard or heavy weight as specified.
   b. Sizes from 3’1” to 4’0”: 5” standard or heavy weight as specified.

3. Hinge Weight and Base Material: Unless otherwise indicated, provide the following:

   a. Exterior Doors: Heavy weight, non-ferrous, ball bearing or oil impregnated bearing hinges unless Hardware Sets indicate standard weight.
   b. Interior Doors: Standard weight, steel, ball bearing or oil impregnated bearing hinges unless Hardware Sets indicate heavy weight.

4. Hinge Options: Comply with the following:

   a. Non-removable Pins: With the exception of electric through wire hinges, provide set screw in hinge barrel that, when tightened into a groove in hinge pin, prevents removal of pin while door is closed; for all out-swinging lockable doors.
   b. Provide single acting spring hinges of the type and style as specified.
   c. Provide double acting spring hinges of the type and style as specified.

5. Manufacturers:

   a. Ives (IV) - 5BB Series, 5-knuckle.
   b. McKinney (MK) - TA/T4A Series, 5-knuckle.
   c. dormakaba BEST (ST) - F/FBB Series, 5-knuckle.

2.3 CONTINUOUS HINGES

A. Continuous Geared Hinges: ANSI/BHMA A156.26 Grade 1-600 continuous geared hinge. with minimum 0.120-inch thick extruded 6063-T6 aluminum alloy hinge leaves and a minimum overall width of 4 inches. Hinges are non-handed, reversible and fabricated to template screw locations. Factory trim hinges to suit door height and prepare for electrical cut-outs.

1. Where specified, provide modular continuous geared hinges that ship in two or three pieces and form a single continuous hinge upon installation.
2. Manufacturers:.

   a. Ives (IV).
   b. Pemko (PE).

c. dormakaba BEST (ST).

2.4 DOOR OPERATING TRIM

A. Flush Bolts and Surface Bolts: Provide products conforming to ANSI/BHMA A156.3 and A156.16, Grade 1.

1. Flush bolts to be furnished with top rod of sufficient length to allow bolt retraction device location approximately six feet from the floor.
2. Furnish dust proof strikes for bottom bolts.
3. Surface bolts to be minimum 8” in length and U.L. listed for labeled fire doors and U.L. listed for windstorm components where applicable.
4. Provide related accessories (mounting brackets, strikes, coordinators, etc.) as required for appropriate installation and operation.
5. Manufacturers:

   a. Burns Manufacturing (BU).
   b. Rockwood (RO).
   c. Trimco (TC).

B. Door Push Plates and Pulls: ANSI/BHMA A156.6 door pushes and pull units of type and design specified in the Hardware Sets. Coordinate and provide proper width and height as required where conflicting hardware dictates.

1. Push/Pull Plates: Minimum .050 inch thick, size as indicated in hardware sets, with beveled edges, secured with exposed screws unless otherwise indicated.
2. Door Pull and Push Bar Design: Size, shape, and material as indicated in the hardware sets. Minimum clearance of 2 1/2-inches from face of door unless otherwise indicated.
3. Offset Pull Design: Size, shape, and material as indicated in the hardware sets. Minimum clearance of 2 1/2-inches from face of door and offset of 90 degrees unless otherwise indicated.
4. Pulls shall be provided with a 10” clearance from the finished floor on the push side to accommodate wheelchair accessibility.
5. Fasteners: Provide manufacturer's designated fastener type as indicated in Hardware Sets. When through-bolt fasteners are in the same location as a push plate, countersink the fasteners flush with the door face allowing the push plate to sit flat against the door.
6. Manufacturers:

   a. Burns Manufacturing (BU).
   b. Rockwood (RO).
   c. Trimco (TC).

2.5 CYLINDERS AND KEYING

A. General: Cylinder manufacturer to have minimum (10) years experience designing secured master key systems and have on record a published security keying system policy.

1. Manufacturers:

   a. ASSA ABLOY ACCENTRA (YA).

B. Cylinder Types: Original manufacturer cylinders able to supply the following cylinder formats and types:

1. Threaded mortise cylinders with rings and cams to suit hardware application.
2. Rim cylinders with back plate, flat-type vertical or horizontal tailpiece, and raised trim ring.
3. Bored or cylindrical lock cylinders with tailpieces as required to suit locks.
4. Tubular deadlocks and other auxiliary locks.
5. Mortise and rim cylinder collars to be solid and recessed to allow the cylinder face to be flush and be free spinning with matching finishes.
6. Keyway: Manufacturer's Standard.

C. Small Format Interchangeable Cores: Provide small format interchangeable cores (SFIC) as specified, core insert, removable by use of a special key; usable with other manufacturers' cylinders.

D. Keying System: Each type of lock and cylinders to be factory keyed.

1. Supplier shall conduct a "Keying Conference" to define and document keying system instructions and requirements.
2. Furnish factory cut, nickel-silver large bow permanently inscribed with a visual key control number as directed by Owner.
3. New System: Key locks to a new key system as directed by the Owner.

E. Key Quantity: Provide the following minimum number of keys:

1. Change Keys per Cylinder: Two (2)
2. Master Keys (per Master Key Level/Group): Five (5).
3. Construction Keys (where required): Ten (10).
4. Construction Control Keys (where required): Two (2).
5. Permanent Control Keys (where required): Two (2).

F. Construction Keying: Provide temporary keyed construction cores.

G. Key Registration List (Bitting List):

1. Provide keying transcript list to Owner's representative in the proper format for importing into key control software.
2. Provide transcript list in writing or electronic file as directed by the Owner.

2.6 KEY CONTROL

A. Key Control Cabinet: Provide a key control system including envelopes, labels, and tags with self-locking key clips, receipt forms, 3-way visible card index, temporary markers, permanent markers, and standard metal cabinet. Key control cabinet shall have expansion capacity of 150% of the number of locks required for the project.

1. Manufacturers:

a. Lund Equipment (LU).
b. MMF Industries (MM).
c. Telkee (TK).

2.7 CYLINDRICAL LOCKS AND LATCHING DEVICES

A. Cylindrical Locksets, Grade 1 (Heavy Duty): ANSI/BHMA A156.2, Series 4000, Operational Grade 1 Certified Products Directory (CPD) listed cylindrical locksets. Listed manufacturers shall meet all functions and features as specified herein.

1. Provide locksets with functions and features as follows:

   a. Meets ANSI/BHMA A156.41 for single motion egress.
   b. Where required by code, provide knurling or abrasive coating on all levers leading to hazardous areas.
   c. Meets UL and CUL Standard 10C Positive Pressure, Fire Test of Door Assemblies with levers that meet A117.1 Accessibility Code.
   d. Exceeds ANSI/BHMA A156.2 requirements by 2.6 times for 3,100 in-lb. abusive locked lever torque with no entry while maintaining egress.
   e. Exceeds ANSI/BHMA A156.2 requirements by 8 times for 1,600 lbs. offset lever pull with no entry for protection against attacks.
   f. Exceeds ANSI/BHMA A156.3 requirements by 2 times for latch retraction with 100 lb. preload while maintaining operation in warped doors.
   g. Exceeds ANSI/BHMA A156.3 requirements by 20 times for no access with minimum 100 vertical impacts for protection against vandalism attempts.
   h. Independent return springs allow lock to exceed ANSI/BHMA A156.2 Grade 1 cycle requirements without lever sag.
   i. Status indicators inside, outside, or on both sides of doors as specified with high visibility red/green or red/white icons to display locked or unlocked state in the rose.
   j. Ten-year limited warranty for mechanical functions.

2. Manufacturers:

   a. ASSA ABLOY ACCENTRA (YA) - 5400LN Series.
   b. Corbin Russwin Hardware (RU) - CLX3300 Series.
   c. Sargent Manufacturing (SA) - 10X Line.
   d. Schlage (SC) - ND Series.

B. Cylindrical Indicator Locksets, Grade 1 (Commercial Duty): ANSI/BHMA A156.2, Series 4000, Operational Grade 1 Certified Products Directory (CPD) listed. Listed manufacturers shall meet all functions and features as specified herein.

1. Provide locksets with functions and features as follows:

   a. Visual status indicators in rose, displaying bold visuals for vacant or occupied lock status.
   b. Meets ANSI/BHMA A156.41 for single motion egress.
   c. Meets UL and CUL Standard 10C Positive Pressure, Fire Test of Door Assemblies with levers that meet A117.1 Accessibility Code.
   d. Three-year limited warranty.

2. Manufacturers:

   a. ASSA ABLOY ACCENTRA (YA) - YPL Series.
   b. Arrow (AW) - APL Series.

2.8 DEADLOCKS AND LATCHES

A. Cylindrical Deadlocks: ANSI/BHMA A156.36 Grade 1 Certified Products Directory (CPD) listed deadlocks to fit standard ANSI 161 preparation. Provide tapered collars to resist vandalism and 1" throw solid steel bolt with hardened steel roller pins. Deadlocks to be products of the same source manufacturer and keyway as other locksets.

1. Manufacturers:

   a. ASSA ABLOY ACCENTRA (YA) - D100 Series.
   b. Arrow (AW) - D Series.
   c. Corbin Russwin Hardware (RU) - DL3000 Series.
   d. Sargent Manufacturing (SA) - 480 Series.
   e. Schlage (SC) - B600 Series.

2.9 LOCK AND LATCH STRIKES

A. Strikes: Provide manufacturer's standard strike with strike box for each latch or lock bolt, with curved lip extended to protect frame, finished to match door hardware set, unless otherwise indicated, and as follows:

1. Flat-Lip Strikes: For locks with three-piece antifriction latchbolts, as recommended by manufacturer.
2. Extra-Long-Lip Strikes: For locks used on frames with applied wood casing trim.
3. Aluminum-Frame Strike Box: Provide manufacturer's special strike box fabricated for aluminum framing.
4. Double-lipped strikes: For locks at double acting doors. Furnish with retractable stop for rescue hardware applications.

B. Standards: Comply with the following:

1. Strikes for Mortise Locks and Latches: BHMA A156.13.
2. Strikes for Bored Locks and Latches: BHMA A156.2.
3. Strikes for Auxiliary Deadlocks: BHMA A156.36.
4. Dustproof Strikes: BHMA A156.16.

2.10 CONVENTIONAL EXIT DEVICES

A. General Requirements: All exit devices specified herein shall meet or exceed the following criteria:

1. Exit devices shall have a five-year warranty.
2. At doors not requiring a fire rating, provide devices complying with NFPA 101 and listed and labeled for "Panic Hardware" according to UL305. Provide proper fasteners as required by manufacturer including sex nuts and bolts at openings specified in the Hardware Sets.
3. Where exit devices are required on fire rated doors, provide devices complying with NFPA 80 and with UL labeling indicating "Fire Exit Hardware". Provide devices with the proper fasteners for installation as tested and listed by UL. Consult manufacturer’s catalog and template book for specific requirements.
4. Except on fire rated doors, provide exit devices with hex key dogging device to hold the pushbar and latch in a retracted position. Provide optional keyed cylinder dogging on devices where specified in Hardware Sets.

5. Devices must fit flat against the door face with no gap that permits unauthorized dogging of the push bar. The addition of filler strips is required in any case where the door light extends behind the device as in a full glass configuration.
6. Flush End Caps: Provide flush end caps made of architectural metal in the same finish as the devices as in the Hardware Sets. Plastic end caps will not be acceptable.
7. Lever Operating Trim: Where exit devices require lever trim, furnish manufacturer's heavy duty escutcheon trim with threaded studs for thru-bolts.

    a. Lock Trim Design: As indicated in Hardware Sets, provide finishes and designs to match that of the specified locksets.
    b. Where function of exit device requires a cylinder, provide a cylinder (Rim or Mortise) as specified in Hardware Sets.

8. Vertical Rod Exit Devices: Where surface or concealed vertical rod exit devices are used at interior openings, provide as less bottom rod (LBR) unless otherwise indicated. Provide dust proof strikes where thermal pins are required to project into the floor.
9. Rim Exit Devices: Exit device rails shall release with less than 5 pounds of pressure per the California Building Code.
10. Narrow Stile Applications: At doors constructed with narrow stiles, or as specified in Hardware Sets, provide devices designed for maximum 2” wide stiles.
11. Dummy Push Bar: Nonfunctioning push bar matching functional push bar.
12. Rail Sizing: Provide exit device rails factory sized for proper door width application.
13. Through Bolt Installation: For exit devices and trim as indicated in Door Hardware Sets.

B. Conventional Push Rail Exit Devices (Heavy Duty): ANSI/BHMA A156.3, Grade 1 Certified Products Directory (CPD) listed exit devices. Listed manufacturers shall meet all functions and features as specified herein.

1. Manufacturers:

    a. ASSA ABLOY ACCENTRA (YA) - 7000 Series.
    b. Corbin Russwin Hardware (RU) - ED4000 / ED5000 Series.
    c. Sargent Manufacturing (SA) - 80 Series.
    d. Von Duprin (VD) - 35A/98 XP Series.

2.11 SURFACE DOOR CLOSERS

A. All door closers specified herein shall meet or exceed the following criteria:

1. General: Door closers to be from one manufacturer, matching in design and style, with the same type door preparations and templates regardless of application or spring size. Closers to be non-handed with full sized covers.
2. Standards: Closers to comply with UL-10C for Positive Pressure Fire Test and be U.L. listed for use of fire rated doors.
3. Cycle Testing: Provide closers which have surpassed 15 million cycles.
4. Size of Units: Comply with manufacturer's written recommendations for sizing of door closers depending on size of door, exposure to weather, and anticipated frequency of use. Where closers are indicated for doors required to be accessible to the Americans with Disabilities Act, provide units complying with ANSI ICC/A117.1.
5. Closer Arms: Provide heavy duty, forged steel closer arms unless otherwise indicated in Hardware Sets.
6. Closers shall not be installed on exterior or corridor side of doors; where possible install closers on door for optimum aesthetics.

7. Closer Accessories: Provide door closer accessories including custom templates, special mounting brackets, spacers and drop plates as required for proper installation. Provide through-bolt and security type fasteners as specified in the hardware sets.

B. Door Closers, Surface Mounted (Large Body Cast Iron): ANSI/BHMA A156.4, Grade 1 Certified Products Directory (CPD) listed surface mounted, heavy duty door closers with complete spring power adjustment, sizes 1 thru 6; and fully operational adjustable according to door size, frequency of use, and opening force. Closers to be rack and pinion type, one piece cast iron body construction, with adjustable backcheck and separate non-critical valves for closing sweep and latch speed control.

1. Large body cast iron surface mounted door closers shall have a 30-year warranty.
2. Manufacturers:

a. Corbin Russwin Hardware (RU) - DC8000 Series.
b. LCN Closers (LC) - 4040XP Series.
c. Norton Rixson (NO) - 9500 Series.
d. Sargent Manufacturing (SA) - 281 Series.

C. Door Closers, Surface Mounted (Unitrol): ANSI/BHMA A156.4, Grade 1 Certified Products Directory (CPD) listed surface mounted closers with door stop mechanism to absorb dead stop shock on arm and top hinge. Hold-open arms to have a spring loaded mechanism in addition to shock absorber assembly. Arms to be provided with rigid steel main arm and secondary arm lengths proportional to the door width.

1. Manufacturers:

a. ASSA ABLOY ACCENTRA (YA) - Unitrol Series.
b. Corbin Russwin Hardware (RU) - Unitrol Series.
c. Norton Rixson (NO) - Unitrol Series.

2.12 ARCHITECTURAL TRIM AND ACCESSORIES

A. Door, Frame and Wall Protective Trim: ANSI/BHMA A156.6, protective products as specified in the hardware sets. Door protection plates shall be not more than 2" less than door width on stop side and 1” less door width on the pull side or on stop side of pairs of doors. Listed manufacturers shall meet all functions and features as specified herein.

1. Provide protective trim with functions and features as follows:

a. Meets ADA requirements for smooth bottom door surfaces.
b. UL Classified options for use on fire-rated doors up to 3 hours.
c. Fabricated from stainless steel, brass, bronze, aluminum, or high-impact plastic.
d. Available in a variety of sizes, finishes, and profiles to suit aesthetic and functional requirements.
e. Designed to protect doors, frames, and adjacent walls from damage due to impact, abrasion, or traffic.
f. Fasteners included; adhesive-backed options available for select models.
g. Ten-year limited warranty.

2. Manufacturers:

a. Burns Manufacturing (BU).

b. Rockwood (RO).
c. Trimco (TC).

B. Security Astragals: ANSI/BHMA A156.22, door gasketing systems astragals and meeting stiles. Listed manufacturers shall meet all functions and features as specified herein.

1. Provide security astragals with functions and features as follows:

a. UL Classified for use on rated openings.
b. Heavy-duty, two-piece design for enhanced strength and tamper resistance.
c. Full-height interlocking profile secures door-jamb gap to prevent prying and forced entry.
d. Horizontal adjustability for precise fit and alignment.
e. Tamper-proof thru bolts and Tek screws included with no strike plate prep required.
f. Ten-year limited warranty.

2. Manufacturers:

a. Pemko (PE) - 353 Series.
b. No Substitution.

2.13 DOOR STOPS AND HOLDERS

A. Door Stops and Bumpers: ANSI/BHMA A156.16, Grade 1 door stops and wall bumpers. Provide wall bumpers, either convex or concave types with anchorage as indicated, unless floor or other types of door stops are specified in Hardware Sets. Do not mount floor stops where they will impede traffic. Where floor or wall bumpers are not appropriate, provide overhead type stops and holders.

1. Manufacturers:

a. Burns Manufacturing (BU).
b. Rockwood (RO).
c. Trimco (TC).

B. Overhead Door Stops and Holders: ANSI/BHMA A156.8, Grade 1 Certified Products Directory (CPD) listed overhead stops and holders to be surface or concealed types as indicated in Hardware Sets. Track, slide, arm and jamb bracket to be constructed of extruded bronze and shock absorber spring of heavy tempered steel. Provide non-handed design with mounting brackets as required for proper operation and function.

1. Manufacturers:

a. Norton Rixson (NO).
b. Rockwood (RO).
c. Sargent Manufacturing (SA).

2.14 ARCHITECTURAL SEALS

A. General: Thresholds, weatherstripping, and gasket seals to be of type and design as specified below or in the Hardware Sets. Provide continuous weatherstrip gasketing on exterior doors and

provide smoke, light, or sound gasketing on interior doors where indicated. At exterior applications provide non-corrosive fasteners and elsewhere where indicated.

B. Smoke Labeled Gasketing: Assemblies complying with NFPA 105 that are listed and labeled by a testing and inspecting agency acceptable to authorities having jurisdiction, for smoke control ratings indicated, based on testing according to UL 1784.

1. Provide smoke labeled perimeter gasketing at all smoke labeled openings.

C. Fire Labeled Gasketing: Assemblies complying with NFPA 80 that are listed and labeled by a testing and inspecting agency acceptable to authorities having jurisdiction, for fire ratings indicated, based on testing according to UL-10C.

1. Provide intumescent seals as indicated to meet UL10C Standard for Positive Pressure Fire Tests of Door Assemblies, and NFPA 252, Standard Methods of Fire Tests of Door Assemblies.

D. Sound-Rated Gasketing: Assemblies that are listed and labeled by a testing and inspecting agency, for sound ratings indicated.

E. Replaceable Seal Strips: Provide only those units where resilient or flexible seal strips are easily replaceable and readily available from stocks maintained by manufacturer.

F. Manufacturers:

1. National Guard Products (NG).
2. Pemko (PE).
3. Zero (ZE).

2.15 BOLLARDS AND PEDESTALS

A. Bollards, pedestals, housings, and accessories used to contain access control devices. Listed manufacturers shall meet all functions and features as specified herein.

1. Provide products with functions and features as follows:

a. Compliant with the Americans with Disabilities Act (ADA) and all local building codes and standards.
b. All seams and edges continuously welded and closed to prevent water intrusion.
c. Removable panels for access to areas that require mounting, wire pass, and otherwise inaccessible areas.
d. Tapered weather shroud on housings.
e. Removable access door gasketed using EPDM rubber seals or equivalent.
f. Stainless steel hinges.
g. Powder coat or hot dipped galvanized with stainless steel or polycarbonate finish as specified.

2. Manufacturers:

a. Pedestal PRO (PP).
b. No Substitution.

2.16 ELECTRONIC ACCESSORIES

A. Door Position Switches: Door position magnetic reed contact switches specifically designed for use in commercial door applications. On recessed models the contact and magnetic housing snap-lock into a 1" diameter hole. Surface mounted models include wide gap distance design complete with armored flex cabling. Provide SPDT, N/O switches with optional Rare Earth Magnet installation on steel doors with flush top channels.

1. Manufacturers:

a. Alarm Controls (AK) - CP1-1026 Series.
b. Sargent Manufacturing (SA) - 3280 Series.
c. Security Door Controls (SD) - DPS Series.
d. Securitron (SU) - DPS Series.

2.17 FABRICATION

A. Fasteners: Provide door hardware manufactured to comply with published templates generally prepared for machine, wood, and sheet metal screws. Provide screws according to manufacturers recognized installation standards for application intended.

2.18 FINISHES

A. Standard: Designations used in the Hardware Sets and elsewhere indicate hardware finishes complying with ANSI/BHMA A156.18, including coordination with traditional U.S. finishes indicated by certain manufacturers for their products.

B. Provide quality of finish, including thickness of plating or coating (if any), composition, hardness, and other qualities complying with manufacturer's standards, but in no case less than specified by referenced standards for the applicable units of hardware

C. Protect mechanical finishes on exposed surfaces from damage by applying a strippable, temporary protective covering before shipping.

D. Sublimation Finishes: Where specified, provide scratch resistant sublimation finishes that use heat and pressure to transfer high-quality, durable patterns and colors onto powder coated surfaces creating realistic finishes like wood and marble.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine scheduled openings, with Installer present, for compliance with requirements for installation tolerances, labeled fire door assembly construction, wall and floor construction, and other conditions affecting performance.

B. Notify architect of any discrepancies or conflicts between the door schedule, door types, drawings and scheduled hardware. Proceed only after such discrepancies or conflicts have been resolved in writing.

3.2 PREPARATION

A. Hollow Metal Doors and Frames: Comply with ANSI/DHI A115 series.

B. Wood Doors: Comply with ANSI/DHI A115-W series.

3.3 INSTALLATION

A. Install each item of mechanical and electromechanical hardware and access control equipment to comply with manufacturer's written instructions and according to specifications.

1. Installers are to be trained and certified by the manufacturer on the proper installation and adjustment of fire, life safety, and security products including: hanging devices; locking devices; closing devices; and seals.

B. Mounting Heights: Mount door hardware units at heights indicated in following applicable publications, unless specifically indicated or required to comply with governing regulations:

1. Standard Steel Doors and Frames: DHI's "Recommended Locations for Architectural Hardware for Standard Steel Doors and Frames."
2. DHI TDH-007-20: Installation Guide for Doors and Hardware.
3. Where indicated to comply with accessibility requirements, comply with ANSI A117.1 "Accessibility Guidelines for Buildings and Facilities."
4. Provide blocking in drywall partitions where wall stops or other wall mounted hardware is located.

C. Retrofitting: Install door hardware to comply with manufacturer's published templates and written instructions. Where cutting and fitting are required to install door hardware onto or into surfaces that are later to be painted or finished in another way, coordinate removal, storage, and reinstallation of surface protective trim units with finishing work specified in Division 9 Sections. Do not install surface-mounted items until finishes have been completed on substrates involved.

D. Push Plates and Door Pulls: When through-bolt fasteners are in the same location as a push plate, countersink the fasteners flush with the door face allowing the push plate to sit flat against the door.

E. Thresholds: Set thresholds for exterior and acoustical doors in full bed of sealant complying with requirements specified in Division 7 Section "Joint Sealants."

F. Storage: Provide a secure lock up for hardware delivered to the project but not yet installed. Control the handling and installation of hardware items so that the completion of the work will not be delayed by hardware losses before and after installation.

3.4 FIELD QUALITY CONTROL

A. Field Inspection (Punch Report): Reference Division 01 Sections “Closeout Procedures”. Produce project punch report for each installed door opening indicating compliance with approved submittals and verification hardware is properly installed, operating and adjusted. Include list of items to be completed and corrected, indicating the reasons or deficiencies causing the Work to be incomplete or rejected.

1. Organization of List: Include separate Door Opening and Deficiencies and Corrective Action Lists organized by Mark, Opening Remarks and Comments, and related Opening Images and Video Recordings.

3.5 ADJUSTING

A. Initial Adjustment: Adjust and check each operating item of door hardware and each door to ensure proper operation or function of every unit. Replace units that cannot be adjusted to operate as intended. Adjust door control devices to compensate for final operation of heating and ventilating equipment and to comply with referenced accessibility requirements.

3.6 CLEANING AND PROTECTION

A. Protect all hardware stored on construction site in a covered and dry place. Protect exposed hardware installed on doors during the construction phase. Install any and all hardware at the latest possible time frame.

B. Clean adjacent surfaces soiled by door hardware installation.

C. Clean operating items as necessary to restore proper finish. Provide final protection and maintain conditions that ensure door hardware is without damage or deterioration at time of owner occupancy.

3.7 DEMONSTRATION

A. Instruct Owner's maintenance personnel to adjust, operate, and maintain mechanical and electromechanical door hardware.

3.8 DOOR HARDWARE SETS

A. The hardware sets represent the design intent and direction of the owner and architect. They are a guideline only and should not be considered a detailed hardware schedule. Discrepancies, conflicting hardware and missing items should be brought to the attention of the architect with corrections made prior to the bidding process. Omitted items not included in a hardware set should be scheduled with the appropriate additional hardware required for proper application and functionality.

1. Quantities listed are for each pair of doors, or for each single door.
2. The supplier is responsible for handing and sizing all products.
3. Where multiple options for a piece of hardware are given in a single line item, the supplier shall provide the appropriate application for the opening.
4. At existing openings with new hardware the supplier shall field inspect existing conditions prior to the submittal stage to verify the specified hardware will work as required. Provide alternate solutions and proposals as needed.

B. Manufacturer’s Abbreviations:

1. MK - McKinney
2. PE - Pemko
3. SU - Securitron
4. RO - Rockwood

5. YA - ASSA ABLOY ACCENTRA
6. RF - Rixson
7. NO - Norton Rixson
8. OT - Other

Hardware Sets

Set: 1.0

Doors: 101A, 106B

1	Continuous Hinge	CFM_SLF-HD1 PT x Length Required		PE
1	Electric Power Transfer	EL-CEPT	630	SU
1	Rim Exit Device, Nightlatch	5CH 7100 B MELR 121NL Temp Core	626	YA
1	Core	A600	626	YA
1	Pull	RM201	US32D	RO
1	Surface Closer	UNI9500	689	NO
1	Gasketing	Provided By Door/Frame Supplier		OT
1	Rain Guard	346C x Width of Frame Head		PE
1	Sweep	345AV x Length Required		PE
1	Threshold	171A		PE
1	Card Reader	Provided By Security Supplier		OT
1	ElectroLynx Harness	QC-C**** x Length Required		MK
1	ElectroLynx Harness	QC-C1500P		MK
1	Position Switch	DPS - M / W-BK (SPDT)		SU
1	Power Supply	AQL-R_ (Size & Type as required)		SU
1	Wiring Diagram	Elevation and Point to Point as Specified		OT

Notes: Operational Narrative:
1. Doors normally closed and secure.
2. Authorized access by card reader retracting exit device latch for predetermined time limit.
3. Egress free for immediate exit.
5. REX switch in push rail allows authorized exit without alarm condition.
6. Exit device latch releases (fail secure) in event of power loss. Keyed cylinder override for emergency access.

Set: 2.0

Doors: 107A, 116B

2	Hinge, Full Mortise, Hvy Wt	T4A3386	US32D	MK
1	Hinge, Full Mortise, Hvy Wt	T4A3386 QC	US32D	MK
1	Electrified Rim Exit, Fail Secure	5CH 7100 B PB691F Temp Core	626	YA
1	Core	A600	626	YA
1	Surface Closer	UNI9500	689	NO
1	Kick Plate	K1050 10" high CSK BEV	US32D	RO

1	Gasketing	303AS (Head & Jambs)	PE
1	Rain Guard	346C x Width of Frame Head	PE
1	Sweep	345AV x Length Required	PE
1	Threshold	171A	PE
1	Card Reader	Provided By Security Supplier	OT
1	ElectroLynx Harness	QC-C**** x Length Required	MK
1	ElectroLynx Harness	QC-C1500P	MK
1	Position Switch	DPS - M / W-BK (SPDT)	SU
1	Power Supply	AQL-R_ (Size & Type as required)	SU
1	Wiring Diagram	Elevation and Point to Point as Specified	OT

Notes: Operational Narrative:

1. Door normally closed and secure.
2. Authorized access by card reader unlocking lever trim for a predetermined time limit. Trim can remain unlocked for open access.
3. Egress free for immediate exit.
4. REX switch allows authorized exit without alarm condition.
5. Door position switch monitors open/closed/latched status.
6. Lever remains locked (fail secure) in event of power loss. Keyed cylinder override for emergency access.

Set: 3.0

Doors: 109A, 110A, 110B, 115B

3	Hinge, Full Mortise, Hvy Wt	T4A3386	US32D	MK
1	Rim Exit Device, Nightlatch	5CH 7100 PB627F Temp Core	626	YA
1	Core	A600	626	YA
1	Surface Closer	UNI9500	689	NO
1	Kick Plate	K1050 10" high CSK BEV	US32D	RO
1	Gasketing	303AS (Head & Jambs)		PE
1	Rain Guard	346C x Width of Frame Head		PE
1	Sweep	345AV x Length Required		PE
1	Threshold	171A		PE
1	Position Switch	DPS - M / W-BK (SPDT)		SU

Set: 4.0

Doors: 116A, 119A

3	Hinge, Full Mortise	TA2314	US32D	MK
1	Storeroom or Closet Lock	PB 5405LN Temp Core	626	YA
1	Core	A600	626	YA
1	Surface Closer	9500	689	NO
1	Kick Plate	K1050 10" high CSK BEV	US32D	RO
1	Wall Stop	403 (or) 441CU (As Required)	US26D	RO

1 Gasketing	303AS (Head & Jambs)		PE
1 Rain Guard	346C x Width of Frame Head		PE
1 Sweep	345AV x Length Required		PE
1 Threshold	171A		PE

Set: 5.0

Doors: 121A, 122A, 124A

3 Hinge, Full Mortise	TA2314	US32D	MK
1 Storeroom or Closet Lock	PB 5405LN Temp Core	626	YA
1 Core	A600	626	YA
1 Surface Closer	UNI9500	689	NO
1 Kick Plate	K1050 10" high CSK BEV	US32D	RO
1 Gasketing	303AS (Head & Jambs)		PE
1 Rain Guard	346C x Width of Frame Head		PE
1 Sweep	345AV x Length Required		PE
1 Threshold	171A		PE
1 Position Switch	DPS - M / W-BK (SPDT)		SU

Set: 6.0

Doors: 116C

6 Hinge, Full Mortise	TA2314	US32D	MK
1 Dust Proof Strike	570	US26D	RO
1 Flush Bolt	555 / 557 (As Required)	US26D	RO
1 Storeroom or Closet Lock	PB 5405LN Temp Core	626	YA
2 Conc Overhead Stop	6 Series	689	RF
1 Astragal	S771C x Door Height		PE
1 Gasketing	303AS (Head & Jambs)		PE
2 Sweep	345AV x Length Required		PE

Set: 7.0

Doors: 118A

3 Hinge, Full Mortise	TA2314	US32D	MK
1 Privacy	AU YPL02	626	YA
1 Surface Closer	9500	689	NO
1 Kick Plate	K1050 10" high CSK BEV	US32D	RO
1 Mop Plate	K1050 4" high CSK BEV	US32D	RO
1 Wall Stop	403 (or) 441CU (As Required)	US26D	RO
1 Gasketing	303AS (Head & Jambs)		PE

Set: 8.0

Doors: 221A

3	Hinge, Full Mortise	TA2314	US32D	MK
1	Passage Latch	PB 5401LN	626	YA
1	Deadbolt	D112 Temp Core	626	YA
1	Core	A600	626	YA
1	Gasketing	303AS (Head & Jambs)		PE
1	Rain Guard	346C x Width of Frame Head		PE
1	Sweep	345AV x Length Required		PE
1	Threshold	171A		PE

Set: 9.0

Doors: 120A

3	Hinge, Full Mortise	TA2314	US32D	MK
1	Push Plate	70C-RKW	US32D	RO
1	Pull Plate	BF 111x70C	US32D	RO
1	Surface Closer	9500	689	NO
1	Mop Plate	K1050 4" high CSK BEV	US32D	RO
1	Armor Plate	K1050 36" high CSK BEV	US32D	RO
1	Gasketing	303AS (Head & Jambs)		PE
1	Sweep	345AV x Length Required		PE
1	Threshold	171A		PE

Set: 10.0

Doors: 101B

1	Hinge, Full Mortise, Hvy Wt	T4A3786 QC	US26D	MK
2	Hinge, Full Mortise, Hvy Wt	T4A3786	US26D	MK
1	Electrified Rim Exit, Fail Secure	5CH 7100 B PB691F Temp Core	626	YA
1	Core	A600	626	YA
1	Surface Closer	9500	689	NO
1	Kick Plate	K1050 10" high CSK BEV	US32D	RO
1	Wall Stop	403 (or) 441CU (As Required)	US26D	RO
3	Silencer	608-RKW		RO
1	Card Reader	Provided By Security Supplier		OT
1	ElectroLynx Harness	QC-C**** x Length Required		MK
1	ElectroLynx Harness	QC-C1500P		MK
1	Position Switch	DPS - M / W-BK (SPDT)		SU
1	Power Supply	AQL-R_ (Size & Type as required)		SU
1	Wiring Diagram	Elevation and Point to Point as Specified		OT

Notes: Operational Narrative:

1. Door normally closed and secure.

2. Authorized access by card reader unlocking lever trim for a predetermined time limit. Trim can remain unlocked for open access.
3. Egress free for immediate exit.
4. REX switch allows authorized exit without alarm condition.
5. Door position switch monitors open/closed/latched status.
6. Lever remains locked (fail secure) in event of power loss. Keyed cylinder override for emergency access.

Set: 11.0

Doors: 111A, 113A, 216A

3	Hinge, Full Mortise	TA2714	US26D	MK
1	Storeroom or Closet Lock	PB 5405LN Temp Core	626	YA
1	Core	A600	626	YA
1	Wall Stop	403 (or) 441CU (As Required)	US26D	RO
3	Silencer	608-RKW		RO

Set: 12.0

Doors: 215A, 217A

3	Hinge, Full Mortise	TA2714	US26D	MK
1	Storeroom or Closet Lock	PB 5405LN Temp Core	626	YA
1	Core	A600	626	YA
1	Conc Overhead Stop	6 Series	689	RF
3	Silencer	608-RKW		RO

Set: 13.0

Doors: 114A

3	Hinge, Full Mortise	TA2714	US26D	MK
1	Storeroom or Closet Lock	PB 5405LN Temp Core	626	YA
1	Core	A600	626	YA
1	Surface Closer	9500	689	NO
1	Kick Plate	K1050 10" high CSK BEV	US32D	RO
1	Wall Stop	403 (or) 441CU (As Required)	US26D	RO
3	Silencer	608-RKW		RO

Set: 14.0

Doors: 112A

3	Hinge, Full Mortise	TA2714	US26D	MK
1	Storeroom or Closet Lock	PB 5405LN Temp Core	626	YA
1	Core	A600	626	YA
1	Surface Closer	CLP9500	689	NO
1	Kick Plate	K1050 10" high CSK BEV	US32D	RO

3 Silencer	608-RKW		RO

Set: 15.0

Doors: 103A

3 Hinge, Full Mortise	TA2714	US26D	MK
1 Entry Lock	PB 5407LN Temp Core	626	YA
1 Core	A600	626	YA
1 Wall Stop	403 (or) 441CU (As Required)	US26D	RO
3 Silencer	608-RKW		RO

Set: 16.0

Doors: 115A

2 Hinge, Full Mortise	TA2714	US26D	MK
1 Hinge, Full Mortise	TA2714 QC	US26D	MK
1 Fail Secure Lock	PB 5491LN Temp Core	626	YA
1 Core	A600	626	YA
1 Wall Stop	403 (or) 441CU (As Required)	US26D	RO
3 Silencer	608-RKW		RO
1 Card Reader	Provided By Security Supplier		OT
1 ElectroLynx Harness	QC-C**** x Length Required		MK
1 ElectroLynx Harness	QC-C1500P		MK
1 Position Switch	DPS - M / W-BK (SPDT)		SU
1 Power Supply	AQL-R_ (Size & Type as required)		SU
1 Wiring Diagram	Elevation and Point to Point as Specified		OT

Notes: Operational Narrative:
1. Door normally closed and secure.
2. Authorized access by card reader allowing ingress by trim.
3. Egress free for immediate exit.
4. Door position switch monitors open/closed status.
5. Lock (fail secure) in event of power loss. Keyed cylinder override for emergency access.

Set: 17.0

Doors: 102A, 108A, 205A, 214A

3 Hinge, Full Mortise	TA2714	US26D	MK
1 Privacy	AU YPL02	626	YA
1 Surface Closer	9500	689	NO
1 Kick Plate	K1050 10" high CSK BEV	US32D	RO
1 Mop Plate	K1050 4" high CSK BEV	US32D	RO
1 Wall Stop	403 (or) 441CU (As Required)	US26D	RO
1 Gasketing	S88BL (Head & Jambs)		PE

Set: 18.0

Doors: 218A

3 Hinge, Full Mortise	TA2714	US26D	MK
1 Passage Latch	PB 5401LN	626	YA
1 Wall Stop	403 (or) 441CU (As Required)	US26D	RO
3 Silencer	608-RKW		RO

Set: 19.0

Doors: 212A

3 Hinge, Full Mortise	TA2714	US26D	MK
1 Passage Latch	PB 5401LN	626	YA
1 Conc Overhead Stop	6 Series	689	RF
1 Gasketing	S88BL (Head & Jambs)		PE

Set: 20.0

Doors: 106A, 213A

3 Hinge, Full Mortise	TA2714	US26D	MK
1 Push Plate	70C-RKW	US32D	RO
1 Pull Plate	BF 111x70C	US32D	RO
1 Conc Overhead Stop	6 Series	689	RF
1 Surface Closer	9500	689	NO
2 Kick Plate	K1050 10" high CSK BEV	US32D	RO
1 Wall Stop	403 (or) 441CU (As Required)	US26D	RO
1 Gasketing	S88BL (Head & Jambs)		PE

Set: 21.0

Doors: 201A, 209A, 210A, 211A

3 Hinge, Full Mortise	TA2714	US26D	MK
1 Passage Latch	PB 5401LN	626	YA
1 Deadbolt	D112 Temp Core	626	YA
1 Core	A600	626	YA
1 Surface Closer	9500	689	NO
1 Kick Plate	K1050 10" high CSK BEV	US32D	RO
1 Wall Stop	403 (or) 441CU (As Required)	US26D	RO
1 Gasketing	S88BL (Head & Jambs)		PE

Set: 22.0

Doors: 201B, 209B

3	Hinge, Full Mortise	TA2314	US32D	MK
1	Passage Latch	PB 5401LN	626	YA
1	Deadbolt	D112 Temp Core	626	YA
1	Core	A600	626	YA
1	Gasketing	303AS (Head & Jambs)		PE
1	Rain Guard	346C x Width of Frame Head		PE
1	Sweep	345AV x Length Required		PE
1	Threshold	171A		PE

Set: 23.0

Doors: 203A, 204A, 207A

3	Hinge, Full Mortise	TA2714	US26D	MK
1	Privacy Lock	PB 5402LN	626	YA
1	Surface Closer	9500	689	NO
1	Wall Stop	403 (or) 441CU (As Required)	US26D	RO
1	Gasketing	S88BL (Head & Jambs)		PE

Set: 24.0

Doors: 209C

3	Hinge, Full Mortise	TA2714	US26D	MK
1	Passage Latch	PB 5401LN	626	YA
1	Surface Closer	9500	689	NO
1	Wall Stop	403 (or) 441CU (As Required)	US26D	RO
1	Gasketing	S88BL (Head & Jambs)		PE

Set: 25.0

Doors: 106C, 116D, 116E, 116F, 117A, G01, G02, G03

1	Hardware	All hardware by door manufacturer	OT

END OF SECTION 08 71 00

SECTION 08 80 00 GLAZING

PART 1 GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section includes requirements including but not limited to:
   1. Tempered glass.
   2. Insulated glass.
   3. Spandrel glazing.
   4. Accessories necessary for a complete installation.

1.3 DEFINITIONS

A. Glass Thickness: Indicated by thickness designations in millimeters according to ASTM C1036.

B. Interspace: Space between lites of an insulating lass unit.

1.4 SUBMITTALS

A. Product Data: Technical data for each type of product including recommended installation and cleaning procedures.

B. Glass Samples: For each type of glass required. Prepare samples from same material to be used for Work.

C. Glazing Schedule: List glass types and thickness for each size opening and location. Use same designations indicated on Drawings.

D. Delegated Design Submittal: For glass indicated to comply with performance requirements and design criteria, including analysis data signed and sealed by the qualified professional engineer responsible for their preparation.

E. Product Certificates: Submit glass product certificates required by code.

F. Glass Manufacturer Certificate: The glass manufacturer shall submit a letter certifying it has reviewed the glazing details proposed for the Project, including the use of gaskets and sealants, and that each product furnished is recommended for the application shown and compliance with the code.

G. Thermal Stress and Wind Load Analyses:
   1. Submit the following from the glass manufacturer:
      a. Thermal stress analysis for each exterior glass unit type, each building elevation. The analysis shall clearly indicate the expected service temperature ranges and the effects of partial and full shading on the glass:
         1) Attach to the thermal stress analysis a statement from the glass manufacturer that based upon this analysis that the resulting thermal stresses will not reduce the specified statistical probability of breakage.

b. Wind load analysis for each glass unit type, each building elevation. The analysis shall indicate the statistical probability of breakage at the design wind pressure does not exceed the specified statistical probability of breakage.

H. Product Test Reports:
1. Submit test reports for insulating glass and glazing sealants, for tests performed by a qualified testing agency:
   a. Glazing sealants: Provide test reports based on testing current sealant formulations within previous 36-month period.
   b. Glazing sealants: Preconstruction adhesion and compatibility test report.

1.5 PERFORMANCE REQUIREMENTS

A. Delegated Design: Design glass panels including comprehensive engineering analysis by a qualified professional engineer lawfully licensed in the State of California, using performance requirements and design criteria indicated.

B. Installed Glazing: Design glazing systems to withstand normal thermal movement and wind and impact loads (where applicable) without failure, including loss or glass breakage attributable to the following: defective manufacture, fabrication, or installation; failure of sealants or gaskets to remain watertight and airtight; deterioration of glazing materials; or other defects in construction.

C. Glazing shall withstand the following design loads within limits and under conditions indicated determined according to ASTM E1300:
1. Design wind pressures: Indicated on Drawings.
2. Design wind pressures:
   a. Determine design wind pressures applicable to Project according to ASCE 7, based on heights above grade indicated on Drawings:
      1) Wind design data: As indicated on Drawings.
      2) Basic wind speed: 110 mph (49 m/s).
      3) Importance factor: 1.25
3. Exposure category: C.
4. Design snow loads: Indicated on Drawings.
5. Thickness of patterned glass: Base design of patterned glass on thickness at thinnest part of the glass.
6. Probability of breakage for sloped glazing: For glass surfaces sloped more than 15 degrees from vertical, design glass for a probability of breakage not greater than 0.001.
7. Maximum lateral deflection: For glass supported on all four edges, limit center of glass deflection at design wind pressure to not more than 1/50 times the short side length or one inch (25 mm), whichever is less.

D. Safety Glazing: Where safety glazing is indicated, provide glazing that complies with 16 CFR 1201, Category II.

E. Thermal and Optical Performance Properties:
1. Provide glass with performance properties specified, as indicated in manufacturer's published test data, based on procedures indicated below:
   a. For monolithic glass lites, properties are based on units with lites six (6) mm thick.
   b. For laminated glass lites, properties are based on products of construction indicated.
   c. For insulating glass units, properties are based on units of thickness indicated for overall unit and for each lite.
   d. U-factors: Center of glazing values, according to NFRC 100 and based on LBL's WINDOW 5.2 computer program, expressed as Btu/sq. ft. x h x deg F (W/sq. m x K).

e. Solar heat gain coefficient and visible transmittance: Center of glazing values, according to NFRC 200 and based on LBL's WINDOW 5.2 computer program.
f. Visible reflectance: Center-of-glazing values, according to NFRC 300.

1.6 QUALITY ASSURANCE

A. Regulatory Requirements:
1. Building code: Comply with applicable requirements for glazing in CBC 2022 California Building Code (CCR Title 24, Part 2, as adopted and amended by DSA).
2. Energy code: Comply with applicable requirements of glazing in the current California Green Building Standards Code California Code of Regulations, Title 24, Part 11.
3. Where safety glazing is indicated, permanently mark glazing with certification label of the SGCC or manufacturer. Label shall indicate manufacturer's name, type of glass, thickness, and safety glazing standard with which glass complies:
   a. As a minimum, provide Category II materials complying with testing requirements in 16 CFR 1201 (Consumer Product Safety Commission Safety Standard for Architectural Glazing Materials, published in the Code of Federal Regulations) and ANSI Z97.1.
   b. Permanently mark safety glass with certification label of Safety Glazing Certification Council.
4. All safety glass shall pass the test requirements of CPSC 16 CFR 1201 criteria, for Category I or II as indicated in Table 2406.2(1), CBC and below:
   a. Nine (9) square feet or less: Category I.
   b. More than nine (9) square feet, sliding doors, and shower glazing: Category I.
5. Insulating glass certification program: Permanently marked either on spacers or on at least one component lite of units with appropriate certification label of IGCC.
6. Comply with published recommendations of glass product organizations:
   a. GANA: Glazing Manual.
   b. IGMA: SIGMA TM-3000 Vertical Glazing Guidelines.
   c. GANA: Laminated Glazing Reference Manual.
   d. AAMA: AAMA GDSG-1 Glass Design for Sloped Glazing.
   e. AAMA: TIR A7 Sloped Glazing Guidelines.
   f. IGMA for Sloped Glazing: IGMA TB-3001 Guidelines for Sloped Glazing.
   g. IGMA for Insulating Glass: SIGMA TM-3000 North American Glazing Guidelines for Sealed Insulating Glass Units for Commercial and Residential Use.
7. Where annealed float glass is indicated, provide annealed float glass, heat strengthened float glass, or fully tempered float glass necessary to comply with performance requirements:
   a. Where heat strengthened float glass is indicated, provide heat strengthened float glass or fully tempered float glass necessary to comply with performance requirements.
   b. Where fully tempered float glass is indicated, provide fully tempered float glass.

B. Manufacturer Qualifications for Insulating Glass Units with Sputter Coated, Low E Coatings: Insulating glass manufacturer who is approved and certified by coated glass manufacturer.

C. Installer Qualifications, Glazer: Experience entity having minimum five (5) years documented experience and who employs glass installers certified under the National Glass Association's Certified Glass Installer Program.

D. Installer Qualifications, Decorative Film: Experience entity having minimum five (5) years documented experience in the installation of glass films.

E. Source Limitations for Glass and Glass Accessories: Obtain each type of glass and glass accessories from a single source.

F. Glass Testing Agency Qualifications: A qualified independent testing agency accredited according to the NFRC CAP 1 Certification Agency Program.

G. Sealant Testing Agency Qualifications: An independent testing agency qualified according to ASTM C1021 to conduct the testing indicated.

H. Mockups: Build mockups to demonstrate aesthetic effects and to set quality standards for materials and execution.

I. Install glazing in mockups specified to match glazing systems required for Project, including glazing methods:
   1. Subject to compliance with requirements, approved mockups may become part of the completed work if undisturbed at time of Substantial Completion.

J. Preconstruction Adhesion and Compatibility Testing:
   1. Test each glass product, tape sealant, gasket, glazing accessory, and glass framing member for adhesion to and compatibility with elastomeric glazing sealants:
      a. Testing is not required if data are submitted based on previous testing of current sealant products and glazing materials matching those submitted.
      b. Use ASTM C1087 to determine whether priming and other specific joint-preparation techniques are required to obtain rapid, optimum adhesion of glazing sealants to glass, tape sealants, gaskets, and glazing channel substrates.
      c. Test no fewer than eight (8) samples of each type of material, including joint substrates, shims, sealant backings, secondary seals, and miscellaneous materials.
      d. Schedule enough time for testing and analyzing results to prevent delaying the Work.
      e. For materials failing tests, submit sealant manufacturer's written instructions for corrective measures including the use of specially formulated primers.

K. Pre-Installation Conference: Conduct conference at site.

1.7 WARRANTY

A. Coated Glass Products - Written warranty signed by manufacturer in which glass manufacturer agrees to replace coated glass units that deteriorate within specified warranty period. Deterioration of coated glass is defined as defects developed from normal use that are not attributed to glass breakage or to maintaining and cleaning coated glass contrary to manufacturer's written instructions. Defects include peeling, cracking, and other indications of deterioration in coating:
   1. Warranty period: Ten (10) years from date of Substantial Completion.

B. Laminated Glass - Written warranty signed by manufacturer in which manufacturer agrees to replace laminated glass units that deteriorate within specified warranty period. Deterioration of laminated glass is defined as defects developed from normal use that are not attributed to glass breakage or to maintaining and cleaning laminated glass contrary to manufacturer's written instructions. Defects include edge separation, delamination materially obstructing vision through glass, and blemishes exceeding those allowed by referenced laminated-glass standard:
   1. Warranty period: Ten (10) years from date of Substantial Completion.

C. Insulating Glass - Written warranty signed by manufacturer in which manufacturer agrees to replace insulating glass units that deteriorate within specified warranty period. Deterioration of insulating glass is defined as failure of hermetic seal under normal use that is not attributed to glass breakage or to maintaining and cleaning insulating glass contrary to

manufacturer's written instructions. Evidence of failure is the obstruction of vision by dust, moisture, or film on interior surfaces of glass:
1. Warranty period: Ten (10) years from date of Substantial Completion.

D. Glass Film - Written warranty signed by glass film manufacturer and installer in which manufacturer and installer agree to replace glass film that crack, peel, delaminate, discolor, change appearance, or failure to meet solar criteria within specified warranty period:
1. Warranty period: Five (5) years from date of Substantial Completion.

1.8 DELIVERY, STORAGE, AND HANDLING

A. Protect glazing materials according to manufacturer's written instructions. Prevent damage to glass and glazing materials from condensation, temperature changes, direct exposure to sun, or other causes.

B. Delivery: Deliver materials in manufacturer’s original, unopened, undamaged containers with identification labels intact.

C. Storage and Protection: Store materials protected from exposure to harmful environmental conditions and at temperature and humidity conditions recommended by manufacturer.

D. Exercise exceptional care to prevent edge damage to glass, and damage/deterioration to coating on glass.

E. Comply with insulating glass manufacturer's written instructions for venting and sealing units to avoid hermetic seal ruptures due to altitude change.

PART 2 PRODUCTS

2.1 MATERIALS

A. Manufacturers are subject to compliance with requirements; provide products by one of the following:
1. Glass:
   a. AGC Glass Company North America, Inc.
   b. Cardinal Glass Industries.
   c. Guardian Industries Corp.; SunGuard.
   d. Oldcastle BuildingEnvelope.
   e. Pilkington North America.
   f. PPG Industries, Inc.
   g. Vetrotech Saint-Gobain.
   h. Viracon, Inc.

B. Ultraclear Float Glass: ASTM C1036, Type I, Class I (clear), Quality-Q3.

C. Fully Tempered Float Glass:
1. ASTM C1048, Kind FT (fully tempered), Condition A (uncoated) unless otherwise indicated, Type I, Class 1 (clear) or Class 2 (tinted) as indicated, Quality-Q3:
   a. Fabrication process: By horizontal (roller hearth) process with roll wave distortion parallel to bottom edge of glass as installed unless otherwise indicated.

D. Heat Strengthened Float Glass:
1. ASTM C1048, Kind HS (heat strengthened), Type I, Condition A (uncoated) unless otherwise indicated, Type I, Class 1 (clear) or Class 2 (tinted) as indicated, Quality-Q3:
   a. Fabrication process: By horizontal (roller hearth) process with roll wave distortion

parallel to bottom edge of glass as installed unless otherwise indicated.

E. Ceramic Coated Spandrel Glass:
1. ASTM C1048, Condition B (spandrel glass, one surface ceramic coated), Type I (transparent glass, flat), Quality Q3 (glazing select), Class 1 (clear), with ceramic coating applied to second surface and complying with the following requirements:
   a. Class 1 (clear).
   b. Class 2 (tinted, heat absorbing, and light reducing):
      1) Tint color: Azurlite by Viracon, Blue, Blue-green, Bronze, EverGreen by Viracon, Green, or Gray.
      2) Kind HS (heat strengthened); Kind FT (fully tempered).
      3) Coating location: Second surface.
      4) Ceramic coating color: Selected by Architect from manufacturer's full range.

2.2 INSULATING GLASS

A. Insulated Glass Units:
1. Low-E coated - double pane with silicone sealant edge secondary seal and polyisobutylene primary seal with aluminum spacer, clear anodized. Outboard lite of 1/4-inch heat-strengthened glass, ASTM C1048, Kind HS. Inboard lite of 1/4-inch clear tempered, Kind FT, glass, Category I, CPSC 16 CFR 1201. Category II for units less than 18 inches above floor, and top edge greater than 36 inches. Low-E coating on surface 3, interpane space purged dry air; total unit thickness of one inch (1"):
   a. PPG Solarban 70XL – Low-E Insulating Glass or equal:
      1) Solarban 70XL (2) Starphire + Clear:
         a) Visible light transmittance of 64 percent, shading coefficients of 0.32.
      2) Glazing U factor and solar heat gain coefficient shall be in accordance with National Fenestration Rating Council, NFRC 100 and NFRC 200.

2.3 GLAZING ACCESSORIES

A. Compatibility: Provide glazing sealants compatible with one another and with other materials in contact, including glass products, seals of insulating glass units, and glazing channel substrates, under conditions of service and application, demonstrated by sealant manufacturer based on testing and field experience.

B. Suitability: Comply with sealant and glass manufacturers' written instructions for selecting glazing sealants suitable for applications indicated and for conditions existing at time of installation.

C. Colors of Exposed Glazing Sealants: Selected by Architect.

D. Glazing Sealant - Neutral curing silicone glazing sealant complying with ASTM C920, Type S, Grade NS, Class 100/50, Use NT:
1. Manufacturers are subject to compliance with requirements; provide products by one of the following:
   a. Dow Corning Corporation.
   b. GE Construction Sealants; Momentive Performance Materials Inc.
   c. May National Associates, Inc.; a subsidiary of Sika Corporation.
   d. Pecora Corporation.
   e. Sika Corporation.

E. Glazing Sealant - Neutral curing silicone glazing sealant complying with ASTM C920, Type S, Grade NS, Class 50, Use NT:
1. Manufacturers are subject to compliance with requirements; provide products by one of

the following:
a. BASF Corporation; Construction Systems.
b. Dow Corning Corporation.
c. GE Construction Sealants; Momentive Performance Materials Inc.
d. May National Associates, Inc.; a subsidiary of Sika Corporation.
e. Pecora Corporation.
f. Polymeric Systems, Inc.
g. Sika Corporation.

F. Glazing Sealant - Neutral curing silicone glazing sealant complying with ASTM C920, Type S, Grade NS, Class 25, Use NT:
1. Manufacturers are subject to compliance with requirements; provide products by one of the following:
a. Bostik, Inc.
b. Dow Corning Corporation.
c. GE Construction Sealants; Momentive Performance Materials Inc.
d. May National Associates, Inc.; a subsidiary of Sika Corporation.
e. Polymeric Systems, Inc.
f. Schnee-Morehead, Inc., an ITW company.
g. Sika Corporation.

G. Glazing Sealant - Acid curing silicone glazing sealant complying with ASTM C920, Type S, Grade NS, Class 25, Use NT:
1. Manufacturers are subject to compliance with requirements; provide products by one of the following:
a. BASF Corporation; Construction Systems.
b. Bostik, Inc.
c. Dow Corning Corporation.
d. GE Construction Sealants; Momentive Performance Materials Inc.
e. May National Associates, Inc.; a subsidiary of Sika Corporation.
f. Pecora Corporation.
g. Polymeric Systems, Inc.
h. Schnee-Morehead, Inc., an ITW company.
i. Sika Corporation.

H. Back Bedding Mastic Glazing Tapes:
1. Preformed, butyl based, 100 percent solids elastomeric tape; nonstaining and nonmigrating in contact with nonporous surfaces; with or without spacer rod recommended in writing by tape and glass manufacturers for application indicated; and complying with ASTM C1281 and AAMA 800 for products indicated below:
a. Tape, where indicated.
b. Tape, for glazing applications in which tape is subject to continuous pressure.
c. Tape, for glazing applications in which tape is not subject to continuous pressure.

I. Expanded Cellular Glazing Tapes:
1. Closed-cell, PVC foam tapes; factory coated with adhesive on both surfaces; and complying with AAMA 800 for the following types:
a. Type 1, for glazing applications in which tape acts as the primary sealant.
b. Type 2, for glazing applications in which tape is used in combination with a full bead of liquid sealant.

J. Miscellaneous Glazing Accessories:
1. Provide products of material, size, and shape complying with referenced glazing standard, with requirements of manufacturers of glass and other glazing materials for application indicated, and with proven record of compatibility with surfaces contacted in installation:

a. Cleaners, primers, and sealers: Types recommended by sealant or gasket manufacturer.
b. Setting blocks: Elastomeric material with a Shore, Type A durometer hardness of 85, plus or minus five (5).
c. Spacers: Elastomeric blocks or continuous extrusions of hardness required by glass manufacturer to maintain glass lites in place for installation indicated.
d. Edge blocks: Elastomeric material of hardness needed to limit glass lateral movement (side walking).
e. Cylindrical glazing sealant backing: ASTM C1330, Type O (open-cell material), of size and density to control glazing sealant depth and otherwise produce optimum glazing sealant performance.
f. Perimeter insulation for fire resistive glazing: Product approved by testing agency listed and labeled fire resistant glazing product with which it is used for application and fire protection rating indicated.

2.4 FABRICATION OF GLAZING UNITS

A. Fabricate glazing units in sizes required to fit openings indicated for Project, with edge and face clearances, edge and surface conditions, and bite complying with written instructions of product manufacturer and referenced glazing publications, to comply with system performance requirements:
1. Allow for thermal movements from ambient and surface temperature changes acting on glass framing members and glazing components:
a. Temperature change: 120 degrees F (67 degrees C), ambient; 180 degrees F (100 degrees C), material surfaces.
2. Edge and surface conditions: Comply with the recommendations of AAMA Structural Properties of Glass for clean cut edges, except comply with manufacturer's recommendations.
3. Exposed glass edges and surface condition: Finish edges flat with an arrissed edge profile (small bevel of uniform width not exceeding 1.5 mm at an angle of approximately 45 degrees to the surface of the glass) with polished (surface is reflective in appearance similar to the major surface of the glass) surface.

B. Cutting: Wheel cut or sawed edges and seamed at manufacturer's option. For site cut glass, provide glass two inches (50.8 mm) larger than required in both dimensions to facilitate cutting of clean cut edges without the necessity of seaming or nipping. Do not cut, seam, nip, or abrade heat treated glass.

C. Butt Glazing: Clean cut or flat grind vertical edges of butt glazed monolithic lites to produce square edges with slight chamfers at junctions of edges and faces.

D. Edges: Grind smooth and polish exposed glass edges and corners.

PART 3 EXECUTION

3.1 FIELD CONDITIONS

A. Environmental Limitations:
1. Do not proceed with glazing when ambient and substrate temperature conditions are outside limits permitted by glazing material manufacturers and when glazing channel substrates are wet from rain, frost, condensation, or other causes.
2. Do not install glazing sealants when ambient and substrate temperature conditions are outside limits permitted by sealant manufacturer or are below 40 degrees F (4.4 degrees C).

B. Field Measurements: Verify actual dimensions of openings and construction contiguous with decorative glass by field measurements before fabrication.

3.2 COORDINATION

A. Coordinate glazing channel dimensions to provide necessary bite on glass, minimum edge and face clearances, and adequate sealant thicknesses, with reasonable tolerances.

3.3 EXAMINATION

A. Examine framing, glazing channels, and stops, with Installer present, for compliance with the following:
   1. Manufacturing and installation tolerances, including size, squareness, and offsets at corners.
   2. Presence and functioning of weep systems.
   3. Minimum required face and edge clearances.
   4. Effective sealing between joints of glass-framing members.

B. Proceed with installation after correcting unsatisfactory conditions.

3.4 PREPARATION

A. Clean glazing channels and framing members receiving glass immediately before glazing. Remove coatings not firmly bonded to substrates:
   1. Comply with manufacturer instructions for wiping of surfaces immediately before application of primers.
   2. Wipe metal surfaces with IPA (isopropyl alcohol) unless otherwise required by compatibility and adhesion testing results.

B. Inspect each piece of glass immediately before installation. Do not install pieces improperly sized or with damaged edges, scratches, abrasion, or evidence damage. Remove labels from glass immediately after installation.

C. Examine glazing units to locate exterior and interior surfaces. Label or mark units so exterior and interior surfaces are readily identifiable. Do not use materials that leave visible marks in the completed Work.

D. Seal vent (breather or capillary) tubes in insulating glass units in accordance with insulating glass manufacturer written recommendations.

E. Glass Film Preparation:
   1. Remove particulate matter on the glass surface using a scraping blade.
   2. Place an absorbent towel on windowsill or sash to absorb moisture generated by the film application.

3.5 GLAZING

A. Comply with combined written instructions of manufacturers of glass, sealants, gaskets, and glazing materials, unless more stringent requirements are indicated, including those in referenced glazing publications.

B. Protect glass edges from damage during handling and installation. Remove damaged glass from Project site and legally dispose of off Project site. Damaged glass includes glass with edge damage or other imperfections that, when installed, could weaken glass, impair performance, or impair appearance.

C. Apply primers to joint surfaces where required for adhesion of sealants, as determined by preconstruction testing.

D. Install setting blocks in sill rabbets, sized and located to comply with referenced glazing publications, unless otherwise required by glass manufacturer. Set blocks in thin course of compatible sealant suitable for heel bead.

E. Do not exceed edge pressures stipulated by glass manufacturers for installing glass lites.

F. Provide spacers for glass lites where length plus width is larger than 50 inches (1270 mm):
   1. Locate spacers directly opposite each other on both inside and outside faces of glass. Install correct size and spacing to preserve required face clearances, unless gaskets and glazing tapes are used that have demonstrated ability to maintain required face clearances and to comply with system performance requirements.
   2. Provide 1/8 inch (3 mm) minimum bite of spacers on glass and use thickness equal to sealant width. With glazing tape, use thickness slightly less than final compressed thickness of tape.

G. Provide edge blocking where indicated or needed to prevent glass lites from moving sideways in glazing channel, as recommended in writing by glass manufacturer and according to requirements in referenced glazing publications.

H. Set glass lites in each series with uniform pattern, draw, bow, and similar characteristics.

I. Set glass lites with proper orientation so that coatings face exterior or interior as specified.

J. Where wedge shaped gaskets are driven into one side of channel to pressurize sealant or gasket on opposite side, provide adequate anchorage so gasket cannot walk out when installation is subjected to movement:
   1. Square cut wedge shaped gaskets at corners and install gaskets as recommended by gasket manufacturer to prevent corners from pulling away; seal corner joints and butt joints with sealant recommended by gasket manufacturer.

K. Tape Glazing:
   1. Position tapes on fixed stops so that, when compressed by glass, the exposed edges are flush with or protrude slightly above sightline of stops:
      a. Install tapes continuously, but not necessarily in one continuous length. Do not stretch tapes to make tapes fit opening.
      b. Cover vertical framing joints by applying tapes to heads and sills first, then to jambs. Cover horizontal framing joints by applying tapes to jambs, then to heads and sills.
      c. Place joints in tapes at corners of opening with adjoining lengths butted together, not lapped. Seal joints in tapes with compatible sealant approved by tape manufacturer.
      d. Do not remove release paper from tape until right before each glazing unit is installed.
      e. Apply heel bead of elastomeric sealant.
      f. Center glass lites in openings on setting blocks, and press firmly against tape by inserting dense compression gaskets formed and installed to lock in place against faces of removable stops. Start gasket applications at corners and work toward centers of openings.
      g. Apply cap bead of elastomeric sealant over exposed edge of tape.

L. Gasket Glazing (Dry):
   1. Cut compression gaskets to lengths recommended by gasket manufacturer to fit

openings exactly, with allowance for stretch during installation:

a. Insert soft compression gasket between glass and frame or fixed stop so it is securely in place with joints miter cut and bonded together at corners.
b. Installation with drive in wedge gaskets: Center glass lites in openings on setting blocks and press firmly against soft compression gasket by inserting dense compression gaskets formed and installed to lock in place against faces of removable stops. Start gasket applications at corners and work toward centers of openings. Compress gaskets to produce a weathertight seal without developing bending stresses in glass. Seal gasket joints with sealant recommended by gasket manufacturer.
c. Installation with pressure glazing stops: Center glass lites in openings on setting blocks and press firmly against soft compression gasket. Install dense compression gaskets and pressure glazing stops, applying pressure uniformly to compression gaskets. Compress gaskets to produce a weathertight seal without developing bending stresses in glass. Seal gasket joints with sealant recommended by gasket manufacturer.
d. Install gaskets to protrude past face of glazing stops.

M. Sealant Glazing (Wet):

1. Install continuous spacers, or spacers combined with cylindrical sealant backing, between glass lites and glazing stops to maintain glass face clearances and to prevent sealant from extruding into glass channel and blocking weep systems until sealants cure. Secure spacers or spacers and backings in place and in position to control depth of installed sealant relative to edge clearance for optimum sealant performance:
   a. Force sealants into glazing channels to eliminate voids and to ensure complete wetting or bond of sealant to glass and channel surfaces.
   b. Tool exposed surfaces of sealants to provide a substantial wash away from glass.

N. Structurally Glazed Units:

1. Set full height continuous structural gaskets/spacers to vertical mullions. Set glass units with void between edge of units and head/sill channel, but with units fully within head/sill rebate so as to provide a proper bite:
   a. Align glass unit edges over vertical mullion continuous structural gasket/spacers and secure with manufacturers recommended temporary cleats.
   b. Structurally seal glass unit to vertical mullions with specified one-part structural silicone sealant. Tool structural silicone flush in alignment to mullion face and perpendicular to face of interior glass light; remove excess structural silicone from glass and metal substrates.
   c. After full cure of structural silicone sealant remove temporary cleats. Immediately seal holes left in the vertical mullions caused by temporary cleats.
   d. Insert and shape weatherseal joint backer rods, or gaskets, into vertical void between glass units and at a proper depth to receive silicone weatherseal sealant.
   e. Place silicone weatherseal sealant into void and tool flush with adjacent exterior glass light faces; remove excess sealant from glass and metal substrates.

O. Glass Film Overlay:

1. Apply squarely aligned to glass edges, uniformly smooth, and free from tears, air bubbles, wrinkles, and rough edges, in pattern/design indicated on Drawings to the interior face of clean glass, according to manufacturer's written instructions, using the squeegee technique to remove moisture:
   a. Cut film edges neatly and square at a uniform distance of 1/16 inch (1.5 mm) to 1/32 inch (0.75 mm) of the window sealing device. Avoid scoring glass when cutting film.
   b. Clean film and leave free of soap residue and squeegee marks.

P. Erection Tolerances:

1. Maximum deviation from vertical: 1/8 inch in any story and 1/4 inch in any 45-foot run.
2. Maximum deviation from horizontal: 1/8 inch in any 30-foot run.
3. Maximum deviation from true alignment: 1/32 inch for any two (2) abutting units. Allow no edge projections.
4. Maximum joint gap: 1/32 inch.

3.6 CLEANING AND PROTECTION

A. Immediately after installation remove nonpermanent labels and clean surfaces.

B. Protect glass from contact with contaminating substances resulting from construction operations. Examine glass surfaces adjacent to or below exterior concrete and other masonry surfaces at frequent intervals during construction, but not less than once a month, for buildup of dirt, scum, alkaline deposits, or stains:
   1. If contaminating substances come into contact with glass, remove substances immediately as recommended in writing by glass manufacturer. Remove and replace glass that cannot be cleaned without damage to coatings.

C. Remove and replace glass that is damaged during construction period.

D. Wash glass on both exposed surfaces not more than four (4) days before date scheduled for inspections that establish date of Substantial Completion. Wash glass as recommended in writing by glass manufacturer.

PART 4 SCHEDULE

4.1 GLAZING SCHEDULE

A. **GL1** Insulated Glass (Exterior): One-inch (25 mm) sealed insulated unit consisting of an exterior lite of Six (6) mm (1/4 inch) low-e tinted tempered float glass, 1/2-inch gas filled air space, and six (6) mm (1/4 inch) clear tempered float glass interior lite.

B. **SP** Ceramic Coated Spandrel Glass (Exterior): One-inch (25 mm) VE1-48 insulating spandrel unit consisting of six (6) mm (1/4 inch) clear VE-48 #2,1/2” air space and six (6) mm (1/4 inch) clear with Viraspan V903 #4. Spandel color to be selected from manufacturers full CUSTOM color range.

C. **GL2** Clear Tempered Glass: ¼ inch (6 mm) clear tempered float glass.

END OF SECTION 08 80 00

SECTION 08 83 00 MIRRORS

PART 1 GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section includes requirements including but not limited to:
   1. Tempered glass mirrors qualifying as safety glazing.
   2. Accessories necessary for a complete installation.

B. Related Sections:
   1. Section 06 10 53: Miscellaneous Rough Carpentry
   2. Section 08 80 00: Glazing.

1.3 DEFINITIONS

A. Deterioration of Mirrors: Defects developed from normal use attributable to the manufacturing process and not to causes other than glass breakage and practices for maintaining and cleaning mirrors contrary to mirror manufacturer's written instructions. Defects include discoloration, black spots, and clouding of the silver film.

1.4 PERFORMANCE REQUIREMENTS

A. Provide mirrors that will not fail under normal usage. Failure includes glass breakage and deterioration attributable to defective manufacture, fabrication, and installation.

1.5 SUBMITTALS

A. Product Data: Technical data for mirror units including description of materials and process used to produce each type of silvered flat glass mirror specified that indicates sources of glass, glass coating components, edge sealer, and quality control provisions.

B. Shop Drawings: Submit mirror elevations, edge details, mirror hardware, and attachments to other work.

1.6 QUALITY ASSURANCE

A. Regulatory Requirements:
   1. Accessibility Requirements - Comply with applicable requirements:
      a. U.S. Architectural and Transportation Barriers Compliance Board Americans with Disabilities Act Accessibility Guidelines for Buildings and Facilities (ADAAG) 2010.
      b. ICC/ANSI A117.1 Accessible and Useable Building and Facilities.
      c. CBC 11B.
   2. Glazing Publications - Comply with published recommendations:
      a. GANA *Glazing Manual* unless more stringent requirements are indicated.
      b. GANA Mirror Division Mirrors, Handle with Extreme Care: Tips for the Professional on the Care and Handling of Mirrors.
   3. Safety Glazing Products: For tempered mirrors, provide products complying with testing requirements in 16 CFR 1201 for Category II materials.

B. Installer Qualifications: Experienced installer having minimum 5 years documented experience and has completed mirror glazing similar in material, design, and extent to that indicated.

C. Source Limitations for Mirrors: Obtain mirrors from one source for each type of mirror indicated.

D. Source Limitations for Mirror Glazing Accessories: Obtain mirror glazing accessories from one source for each type of accessory indicated.

E. Preconstruction Mirror Mastic Compatibility Test: Submit mirror mastic products to mirror manufacturer for testing to determine compatibility of mastic with mirror backing and substrates on which mirrors are installed.

1.7 WARRANTY

A. Warranty: Warranty made out to Owner and signed by mirror manufacturer agreeing to replace mirrors that deteriorate, f.o.b. the nearest shipping point to site, within specified warranty period:
   1. Warranty Period: Five years from date of Substantial Completion.

1.8 DELIVERY, STORAGE, AND HANDLING

A. Protect mirrors according to mirror manufacturer's written instructions and necessary to prevent damage to mirrors from condensation, temperature changes, direct exposure to sun, or other causes.

B. Comply with mirror manufacturer's written instructions for shipping, storing, and handling mirrors as needed to prevent deterioration of silvering, damage to edges, and abrasion of glass surfaces and applied coatings. Store indoors, protected from moisture including condensation.

PART 2 PRODUCTS

2.1 MATERIALS

A. Manufacturers: Subject to compliance with requirements, provide mirrors by one of the following:
   1. Guardian Industries Corp.
   2. Arch Aluminum & Glass Co., Inc.
   3. Virginia Mirror Company, Inc.
   4. VVP America, Inc.; Binswanger Mirror Products.
   5. Walker Glass Co., Ltd.

B. Tempered Glass Mirrors: Comply with ASTM C1503, Mirror Glazing Quality, for blemish requirements in annealed float glass before silver coating is applied, for coating requirements, and with other requirements not affected by tempering process; and comply with ASTM C1048 for Kind FT, Condition A, tempered float glass before silver coating is applied.
   1. Nominal Thickness: 6.0 mm.
   2. Safety Glazing Products: For tempered mirrors, provide products that comply with 16 CFR 1201, Category II.

C. Setting Blocks: Elastomeric material with Type A Shore durometer hardness of 85, plus or minus 5.

D. Edge Sealer: Coating compatible with glass coating and approved by mirror manufacturer for use in protecting against silver deterioration at mirrored glass edges.

E. Mirror Mastic: Adhesive setting compound, produced specifically for setting mirrors and certified by both mirror manufacturer and mastic manufacturer as compatible with glass coating and substrates on which mirrors will be installed. Provide product recommended by mirror manufacturer.

F. Film Backing for Safety Mirrors: Film backing and pressure-sensitive adhesive; both compatible with mirror backing paint as certified by mirror manufacturer.

G. Top and Bottom Aluminum J-Channels:
1. Aluminum extrusions with a return deep enough to produce a glazing channel to accommodate mirrors of thickness indicated and in lengths required to cover bottom and top edges of each mirror in a single piece:
   a. Bottom Trim - J-channels formed with front leg and back leg not less than 3/8 inch and 7/8 inch (9.5 mm and 22 mm) in height, respectively, and a thickness of not less than 0.04 inch (1.0 mm):
      1) Products are subject to compliance with requirements; provide one of the following:
         a) Laurence, C. R. Co., Inc.; CRL Standard "J" Channel.
         b) Sommer & Maca Industries, Inc.; Aluminum Shallow Nose "J" Moulding Lower Bar.
2. Top Trim:
   a. J-channels formed with front leg and back leg not less than 5/8 and 1 inch (16 and 25 mm) in height, respectively, and a thickness of not less than 0.04 inch (1.0 mm):
      1) Products are subject to compliance with requirements; provide one of the following:
         a) Laurence, C. R. Co., Inc.; CRL Deep "J" Channel.
         b) Sommer & Maca Industries, Inc.; Aluminum Deep Nose "J" Moulding Upper Bar.
3. Finish: Clear.

H. Top and Bottom Clips: As indicated.

I. Fasteners: Fabricated of same basic metal and alloy as fastened metal and matching it in finished color and texture where fasteners are exposed.

J. Anchors and Inserts: Provide devices as required for mirror hardware installation. Provide toothed or lead shield expansion bolt devices for drilled in place anchors. Provide galvanized anchors and inserts for applications on inside face of exterior walls and where indicated.

2.2 FABRICATION

A. Mirror Sizes: To suit conditions, and before tempering, cut mirrors to final sizes and shapes.

B. Cutouts: Fabricate cutouts for notches and holes in mirrored glass without marring visible surfaces. Locate and size cutouts so they fit closely around penetrations in mirrored glass.

C. Mirror Edge Treatment:
1. Cutting and Polishing: Flat edges where the clean-cut square edge of the glass is flat and surface edges are slightly arrissed. After grinding the arisses, polish edges to a high gloss surface where the surface reflectivity is similar in appearance to the major surface of the glass.

2. Edge Sealing: Immediately after cutting to final sizes, and applying edge treatment, factory seal edges of mirrors with edge sealer to prevent chemical or atmospheric penetration of glass coating.

D. Film Backed Safety Mirrors: Apply film backing with adhesive coating over mirror backing paint as recommended in writing by film backing manufacturer to produce a surface free of bubbles, blisters, and other imperfections.

PART 3 EXECUTION

3.1 FIELD CONDITIONS

A. Environmental Limitations: Do not install mirrors until ambient temperature and humidity conditions are maintained at levels indicated for final occupancy.

3.2 EXAMINATION

A. Examine substrates, over which mirrors are to be mounted for compliance with installation tolerances, substrate preparation, and conditions affecting performance. Verify compatibility with and suitability of substrates, including compatibility of mirror mastic with existing finishes or primers. Proceed with mirror installation after unsatisfactory conditions have been corrected and surfaces are dry.

3.3 PREPARATION

A. Comply with mastic manufacturer's written installation instructions for preparation of substrates, including coating surfaces with mastic manufacturer's special bond coating where applicable.

3.4 INSTALLATION

A. Install mirrors to comply with mirror manufacturer's written instructions and with referenced GANA publications. Mount mirrors accurately in place in a manner that avoids distorting reflected images. Provide minimum air space of 1/8 inch (3 mm) between back of mirrors and mounting surface for air circulation between back of mirrors and face of mounting surface.

B. Wall Mounted Mirrors: Install mirrors with mastic and mirror hardware. Attach mirror hardware securely to mounting surfaces with mechanical fasteners installed with anchors or inserts as applicable. Install fasteners so heads do not impose point loads on backs of mirrors:
   1. For metal or plastic clips, place a felt or plastic pad between mirror and each clip to prevent spalling of mirror edges.
   2. Top and Bottom Aluminum J-Channels: Provide setting blocks 1/8 inch (3 mm) thick by 4 inches (100 mm) long at quarter points. To prevent trapping water, provide, between setting blocks, two slotted weeps not less than 1/4 inch (6.4 mm) wide by 3/8 inch (9.5 mm) long at bottom channel.
   3. Mirror Clips - Place a felt or plastic pad between mirror and each clip to prevent spalling of mirror edges. Locate clips to be symmetrically placed and evenly spaced:
      a. Fabricate bottom trim in single lengths to fit and cover bottom edges of mirrors. Locate top clips so they are symmetrically placed and evenly spaced.
   4. Mastic - Apply mastic to comply with mastic manufacturer's written instructions for coverage and to allow air circulation between back of mirrors and face of mounting surface:
      a. Apply mastic in vertical beads or mounds to the wall, not to the mirror back to avoid

potential damage caused by mastic applicator tools, in compliance with mastic manufacturer's written instructions to allow air circulation between back of mirrors and face of mounting surface.

b. Make each vertical bead approximately 1/2 inch in width with minimum of one bead for every square foot of mirror.
c. Make each mound approximately 1-1/2 inch in diameter with a minimum of one mound for every square foot of mirror.
d. Do not apply mastic within 6 inches of the mirror edges to prevent squeeze out. Place beads or mounds leaving a space between mirror and wall. After mastic is applied, align mirrors and press into place. Spread each vertical bead to approximately 2 inches in width and spread each mound to a pat approximately 3-1/2 inch in diameter after pressing mirror into place.
e. After mastic is applied, align mirrors and press into place while maintaining a minimum air space of 1/8 inch (3 mm) between back of mirrors and mounting surface.

3.5 CLEANING AND PROTECTION

A. Protect mirrors from breakage and contaminating substances resulting from construction operations. Do not permit edges of mirrors to be exposed to standing water. Maintain environmental conditions that will prevent mirrors from being exposed to moisture from condensation or other sources for continuous periods of time.

B. Wash exposed surface of mirrors not more than four days before date scheduled for inspections that establish date of Substantial Completion. Wash mirrors as recommended in writing by mirror manufacturer.

END OF SECTION 08 83 00

SECTION 09 29 00 GYPSUM BOARD

PART 1 GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section Includes requirements including but not limited to:
1. Paper faced gypsum board.
2. Mold, mildew, moisture resistant paper faced gypsum board.
3. Fiberglass mat faced gypsum board.
4. Cement board.
5. Texture finishes.
6. Accessories.
7. Trim.
8. Joint tape.
9. Joint compounds.

B. Related Sections:
1. Section 05 50 00: Metal Fabrications.
2. Section 06 10 00: Rough Carpentry.
3. Section 08 11 13: Hollow Metal Doors and Frames.
4. Section 08 31 13: Access Doors and Frames.
5. Section 08 51 00: Aluminum Windows.
6. Section 09 30 00: Tiling.
7. Section 09 90 00: Painting and Coating.

1.3 REFERENCES

A. American National Standards Institute (ANSI):
1. ANSI A108 Interior Installation of Cementitious Backer Units.

B. ASTM International (ASTM):
1. ASTM C475/C475M Standard Specification for Joint Compound and Joint Tape for Finishing Gypsum Board.
2. ASTM C840 Standard Specification for Application and Finishing of Gypsum Board.
3. ASTM C919 Standard Practice for Use of Sealants in Acoustical Applications.
4. ASTM C1002 Standard Specifications for Steel Self-Piercing Tapping Screws for Application of Gypsum Panel Products or Metal Plaster Bases to Wood Studs or Steel Studs.
5. ASTM C1178/C1178M Standard Specification for Coated Glass Mat Water-Resistant Gypsum Backing Panel.
6. ASTM C1325 Standard Specification for Fiber-Mat Reinforced Cementitious Backer Units.
7. ASTM C1396/C1396M Standard Specification for Gypsum Board.
8. ASTM C1629/C1629M Standard Classification for Abuse-Resistant Nondecorated Interior Gypsum Panel Products and Fiber-Reinforced Cement Panels.
9. ASTM C1658/C1658M Standard Specification for Glass Mat Gypsum Panels.
10. ASTM C1766 Standard Specification for Factory-Laminated Gypsum Panel.
11. ASTM D3273 Standard Test Method for Resistance to Growth of Mold on the Surface

of Interior Coatings in an Environmental Chamber.
12. ASTM E814 Standard Test Method for Fire Tests of Through-Penetration Fire Stops.
13. ASTM G21 Standard Practice for Determining Resistance of Synthetic Polymeric Materials to Fungi.

C. Gypsum Association (GA):
1. GA-214 Recommended Levels of Gypsum Board Finish.
2. GA-216 Application and Finishing of Gypsum Panel Products.

1.4 SUBMITTALS

A. Product Data: Submit for each type of drywall including calculations for loadings and stresses of exterior walls and specially fabricated framing based on manufacturer's load tables.
1. Gypsum Board.
2. Cementitious Board.
3. Texture finishes.
4. Trim accessories.
5. Samples
6. Textured Finishes: Apply to gypsum board, 4 by 6 inches.
7. Trim Accessories: 12-inch length of trim.

B. Shop Drawings: Indicate locations, fabrication, and installation of control and expansion joints including plans, elevations, sections, details of components, and attachments to other units of Work.

C. Samples:
1. Trim Accessories: Full size Sample in 12 inch (300 mm) long length for each trim accessory indicated.
2. Textured Finishes: 12 inches by 12 inches (300 mm by 300 mm) for each textured finish indicated and on same backing indicated for Work.

D. Calculations: Submit calculations verifying steel partition stud minimum base metal thickness and depth compliance with Code and ASTM C645 for height, load, and deflection.

E. Evaluation Reports: ICC-ES reports for dimpled steel studs and runners and firestop tracks.

F. Sustainable Design Submittals.
1. Sustainable Design closeout Requirements.

1.5 QUALITY ASSURANCE

A. Regulatory Requirements:
1. 2022 California Building Code (CBC) (CCR Title 24, Part 2, as adopted and amended by DSA):
   a. CBC-7 – Chapter 7, Fire Resistant Materials and Construction
   b. CBC-19A – Chapter 19A, Concrete
   c. CBC – Chapter 25, Gypsum Board and Plaster.
2. Division of the State Architect, Interpretation of Regulations (DSA-IR):
   a. DSA-IR 25-3, Drywall Ceiling Suspension Conventional Construction-One Layer.
   b. DSA-IR 25-2.13, Metal Suspension Systems for Lay in Panel Ceilings.
3. Fire Resistance Rated Assemblies: For fire resistance rated assemblies, provide materials and construction identical to those tested in assembly indicated according to ASTM E119 by an independent testing agency.

B. Single Source Responsibility:
   1. Framing Members: Obtain steel framing members from single manufacturer.
   2. Panel Products: Obtain each type of gypsum board and other panel products from single manufacturer.
   3. Finishing Materials: To the extent possible, obtain finishing materials from same manufacturer supplying gypsum board products. When not possible, obtain materials from manufacturer acceptable to gypsum board manufacturer.

1.6 DELIVERY, STORAGE, AND HANDLING

A. Deliver materials in original packages, containers, or bundles bearing brand name and identification of manufacturer or supplier.

B. Store materials inside under cover and keep them dry and protected against weather, condensation, direct sunlight, construction traffic, and potential causes of damage. Stack panels flat and supported on risers on a flat platform to prevent sagging.

PART 2 PRODUCTS

2.1 MATERIALS

A. Basis of Design: Products from **National Gypsum Company**, 2001 Rexford road, Charlotte, North Carolina 2811. 704-365-7300 ng@nationalgypsum.com.
   1. All other manufacturers are subject to compliance with requirements to match or exceed products listed here-in.

2.2 PAPER FACED GYPSUM BOARD

A. Gypsum Board, Regular Core, ASTM C1396/C1396M:
   1. Gold Bond® Gypsum Board.
   2. Gold Bond® High Strength LITE® Gypsum Board.
   3. Gold Bond® High Flex® Gypsum Board.
      a. Thickness: 3/8 inch.
      b. Core: Regular.
      c. Edges: Tapered.

B. Gypsum Board, Fire-Resistant Core: ASTM C1396/C1396M.
   1. Gold Bond® Fire-Shield C™ 1/2" Gypsum Board.
   2. Gold Bond® Fire-Shield C™ 5/8" Gypsum Board.
      a. Thickness: 5/8 inch.
      b. Core: Type C, Type X, Ultra-Shield, PER DRAWINGS.
      c. Edges: Tapered.

2.3 MOLD, MILDEW, MOISTURE RESISTANT PAPER FACED GYPSUM BOARD

A. Gypsum Board, Regular Core, Mold, Mildew, Moisture Resistant: ASTM C1396/C1396M.
   1. Gold Bond® XP® Gypsum Board.
      a. Thickness: 1/2 inch.
      b. Core: Regular.
      c. Edges: Tapered.
      d. Mold/Mildew Resistance: ASTM D3273; Score of 10.
      e. Mold/Mildew Resistance: ASTM G21, Score of 0.

B. Gypsum Board, Fire Resistant Core, Mold, Mildew Moisture Resistant: ASTM C1396/C1396M.

1. Gold Bond® XP® Fire-Shield® Gypsum Board.
2. Gold Bond® XP® Fire-Shield C™ 5/8" Gypsum Board.
3. Gold Bond® XP® Ultra-Shield FS® 3/4" Gypsum Board.
4. Gold Bond® Shaftliner XP®.
   a. Thickness: 5/8 inch.
   b. Core: Regular, Type X, Type C, Ultra-Shield, PER DRAWINGS.
   c. Edges: Square.
   d. Mold/Mildew Resistance: ASTM D3273; Score of 10.
   e. Mold/Mildew Resistance: ASTM G21, Score of 0.

C. Gypsum Board, Mold, Mildew, Moisture, and Abuse Resistant: ASTM C1396/C1396M.
1. Gold Bond® XP® Hi-Abuse® Gypsum Board.
   a. Thickness: 5/8 inch.
   b. Core: Type X.
   c. Edges: Tapered.
   d. Mold/Mildew Resistance: ASTM D3273; Score of 10.
   e. Surface Abrasion: ASTM C1629/C1629M; Level 3.
   f. Indentation: ASTM C1629/C1629M; Level 1.
   g. Soft-Body Impact: ASTM C1629/C1629M; Level 2.
   h. Hard-Body Impact: ASTM C1629/C1629M; Level 1.

D. Gypsum Board, Mold, Mildew, Moisture, and Impact Resistant: ASTM C1396/C1396M.
1. Gold Bond® XP® Hi-Impact® Gypsum Board.
   a. Thickness: 5/8 inch.
   b. Core: Type X.
   c. Edges: Tapered.
   d. Mold/Mildew Resistance: ASTM D3273; Score of 10.
   e. Surface Abrasion: ASTM C1629/C1629M; Level 3.
   f. Indentation: ASTM C1629/C1629M; Level 1.
   g. Soft-Body Impact: ASTM C1629/C1629M; Level 3.
   h. Hard-Body Impact: ASTM C1629/C1629M; Level 3.

E. Gypsum Board, Mold, Mildew, Moisture Resistant, with Sound Dampening: ASTM C1396/C1396M and ASTM C1766.
1. Gold Bond® SoundBreak XP Wall® Board.
2. Gold Bond® SoundBreak XP Ceiling® Board.
3. Gold Bond® SoundBreak XP Retrofit® Board.
   a. Thickness: 5/8 inch.
   b. Core: Type X.
   c. Edges: Tapered.
   d. Surface Abrasion: ASTM C1629/C1629M; Level 3.
   e. Mold/Mildew Resistance: ASTM D3273; Score of 10.
   f. Mold/Mildew Resistance: ASTM G21, Score of 0.

2.4 FIBERGLASS MAT FACED GYPSUM BOARD

A. Gypsum Board, Tile Backer: ASTM C1178/C1178M.
1. Gold Bond® eXP® Tile Backer.
2. Gold Bond® eXP® Fire-Shield® Tile Backer.
   a. Thickness: 5/8 inch.
   b. Core: Regular.
   c. Edges: Square.
   d. Mold/Mildew Resistance: ASTM D3273; Score of 10.

2.5 CEMENT BOARD

A. Cement Board, Backer, Interior/Exterior: ASTM C1325.
   1. PermaBASE® Cement Board.
   2. PermaBASE PLUS® Cement Board.
      a. Thickness: 5/8 inch.
      b. Weight: 2.9 lbs./sq.ft.
      c. Edges: Round.
      d. Mold/Mildew Resistance: ASTM D3273; Score of 10.
      e. Shear Bond Strength: 241 psi.

B. Cement Board, Interior Underlayment: ASTM C1325.
   1. PermaBASE UltraBacker® Cement Board.
      a. Thickness: 1/4 inch.
      b. Weight: 1.8 lbs./sq.ft.
      c. Edges: Round.
      d. Mold/Mildew Resistance: ASTM D3273; Score of 10.

2.6 TEXTURE FINISHES

A. Primer: Manufacturer recommended for surface being coated.

B. Non-Aggregated Wall and Ceiling Texture:
   1. ProForm™ Wall and Ceiling Spray.
   2. ProForm™ Perfect Spray® EM.
      a. Texture: Orange peel.

2.7 ACCESSORIES

A. Acoustical Sealant: ASTM C919.
   1. Manufacturers and Products:
      b. Grabber Construction Products; Acoustical Sound and Smoke Sealant GSCSF.
      a. Specified Technologies Inc.; SpecSeal SNS Smoke N Sound Acoustical Sealant.
      b. BOSS Products; BOSS 826 Acoustical Acrylic Sound Sealant.

B. Firestopping: ASTM E814.
   1. Manufacturers and Products:
      a. Specified Technologies Inc.; SpecSeal SSP Putty & Putty Pads.
      b. BOSS Products; BOSS 818 Fire Rated Putty Pads.

C. Fasteners for Cement Board: ASTM C1002.
   1. PermaBASE™ Cement Board Screws Hi-Lo.
      a. Wafer head, corrosion-resistant.
      b. Thickness, overall: 2-1/2 inch.
   2. PermaBASE™ Cement Board Screws Drill Point.
      a. Wafer head, corrosion-resistant.
      b. Thickness, overall: 2-1/2 inch.

D. Fasteners for Tile Backer: ASTM C1002.
   1. Fasteners for 1/2 inch thick panels:
      a. Wood Framing: 1-1/4 inch minimum corrosion resistant course thread bugle head.
      b. Metal Framing: 1 inch minimum corrosion resistant sharp point or drill point bugle head screw.

E. Fasteners for 5/8 inch thick panels:
   1. Wood Framing: 1-1/4 inch minimum corrosion resistant course thread bugle head, or, As required by fire-rated assembly.

2.8 TRIM

A. Vinyl Trim:
   1. One-Piece: Extruded vinyl form; vinyl coating matching boards.(1/2 inch Board)
   2. Two-Piece: Extruded vinyl form; vinyl coating matching boards.(5/8 inch Board)

2.9 JOINT TAPE

A. Paper Tape: 2-1/16 inch wide, cross-fibered paper, ASTM C475/C475M.
   1. ProForm™ Paper Joint Tape.

B. Fiberglass Mesh Tape: Polymer-coated (alkali-resistant) fiberglass mesh.
   1. PermaBASE™ Cement Board Tape, 4 inch.

2.10 JOINT COMPOUNDS

A. Setting Type Compound
   1. Field mixed quick setting and hardening: ASTM C475/C475M.
      a. ProForm® Quick Set™ Setting Compound.
   2. Field mixed quick setting and hardening; fire resistant: ASTM E814.
      a. ProForm® Quick Set™ Fire and Smoke Stop 90 Setting Compound.

B. Drying Type Compound:
   1. Ready mix, vinyl base: ASTM C475/C475M.
      b. ProForm® All Purpose Joint Compound.
      c. ProForm® Ultra Lite® All Purpose Joint Compound.
      d. ProForm® All Purpose Machine Grade Joint Compound.
   2. Ready mix, vinyl base, topping compound: ASTM C475/C475M.
      a. ProForm® Topping Joint Compound.
   3. Ready mix, vinyl base, embedding tape and trim: ASTM C475/C475M.
      a. ProForm® Taping Joint Compound.
      b. ProForm® Taping Lite Joint Compound.
   4. Ready mix, vinyl base, specialty: ASTM C475/C475M.
      a. ProForm® All Purpose Texture Grade Joint Compound.

PART 3 EXECUTION

3.1 PROJECT CONDITIONS

A. Environmental Limitations:
   1. Comply with ASTM C840 for gypsum board manufacturer's written instructions, whichever are more stringent:
      b. Do not install paper faced gypsum panels until installation areas are enclosed and conditioned.

B. Room Temperatures: Maintain minimum 40 degrees F (4 degrees C). For adhesive attachment and finishing of gypsum board, maintain minimum 50 degrees F (10 degrees C) for 48 hours before application and continuously after until dry. Do not exceed 95 degrees F (35 degrees C) when using temporary heat sources.

C. Ventilation: Ventilate building spaces as required to dry joint treatment materials. Avoid drafts during hot, dry weather to prevent finishing materials from drying too rapidly.

D. Do not install panels that are wet, moisture damaged, and mold damaged:
   1. Indications that panels are wet or moisture damaged include, but are not limited to,

discoloration, sagging, or irregular shape.
2. Indications that panels are mold damaged include, but are not limited to, fuzzy or splotchy surface contamination and discoloration.

3.2 EXAMINATION

A. Examine areas and substrates including welded hollow metal frames, cast in anchors, and structural framing, for compliance with requirements and other conditions affecting performance. Proceed with installation after unsatisfactory conditions have been corrected.

3.3 PREPARATION

A. Suspended Assemblies: Coordinate installation of suspension systems with installation of overhead structure to ensure that inserts and other provisions for anchorages to building structure have been installed to receive hangers at spacing required to support the Work and that hangers will develop their full strength. Furnish concrete inserts and other devices indicated to other trades for installation in advance of time needed for coordination and construction.

3.4 INSTALLATION

A. Installation Standard: ASTM C754, except comply with framing sizes and spacing indicated. Install in accordance with:
1. Manufacturer recommendations.
2. ANSI A108.
3. GA-214.
4. GA-216.

B. Gypsum Board Assemblies: Comply with requirements in ASTM C840 applicable to framing installation.

C. Gypsum Board:
1. Install interior gypsum board where indicated on drawings.
   a. Single Layer Application:
      1) On ceilings, apply gypsum panels before wall/partition board application to greatest extent possible and at right angles to framing, unless otherwise indicated.
      2) On partitions/walls, apply gypsum panels vertically (parallel to framing), unless otherwise indicated or required by fire resistance rated assembly, and minimize end joints. Stagger abutting end joints not less than one framing member in alternate courses of panels.
      3) Fastening Methods: Apply gypsum panels to supports with steel drill screws.
   b. Multilayer Application:
      1) On partitions/walls, apply gypsum board indicated for base layers and face layers vertically (parallel to framing) with joints of base layers located over stud or furring member and face-layer joints offset at least one stud or furring member with base-layer joints unless otherwise indicated or required by fire-resistance-rated assembly. Stagger joints on opposite sides of partitions.
      2) On Z shaped furring members, apply base layer vertically (parallel to framing) and face layer either vertically (parallel to framing) or horizontally (perpendicular to framing) with vertical joints offset at least one furring member. Locate edge joints of base layer over furring members.
      3) Fastening Methods: Fasten base layers and face layers separately to supports with screws.

D. Cementitious Backer Units: ANSI A108.11; install where indicated with 1/4-inch (6.4 mm) gap where panels abut other construction or penetrations. Where tile backing panels abut other types of panels in same plane, shim surfaces to produce a uniform plane across panel surfaces.

E. Exterior Gypsum Board Soffits:
1. Apply panels perpendicular to supports, with end joints staggered and located over supports:
   a. Install with 1/4 inch open space where panels abut other construction or structural penetrations.
   b. Fasten with corrosion-resistant screws.

F. Trim Accessories:
1. For trim with back flanges intended for fasteners, attach to framing with same fasteners used for panels. Attach trim according to manufacturer's written instructions:
   a. Control Joints: Install control joints according to ASTM C840 and in specific locations approved by Architect for visual effect.
   b. Exterior Trim:
      1) Install in the following locations:
         a) Cornerbead: Use at outside corners.
         b) LC Bead: Use at exposed panel edges.
   c. Interior Trim - Install in the following locations:
      1) Cornerbead: Use at outside corners, unless otherwise indicated.
      2) Bullnose Bead: Use at outside corners.
      3) LC Bead: Use at exposed panel edges.
      4) L Bead: Use where indicated or necessary.
      5) U Bead: Use at exposed panel edges.

G. Gypsum Board Finishing:
1. Treat gypsum board joints, interior angles, edge trim, control joints, penetrations, fastener heads, surface defects, and elsewhere required to prepare gypsum board surfaces for decoration. Promptly remove residual joint compound from adjacent surfaces:
   a. Prefill open joints, rounded or beveled edges, and damaged surface areas.
   b. Apply joint tape over gypsum board joints, except those with trim having flanges not intended for tape.
   c. Gypsum Board Finish Levels - Finish panels to levels indicated below and according to ASTM C840:
      1) Level 1: Ceiling plenum areas, concealed areas, and where indicated.
      2) Level 2: Panels that are substrate for tile.
      3) Level 3: Surfaces be coated with drywall primer prior to final finishes. Heavy or medium texture finishes before final painting, or where heavy-grade wall coverings are to be applied as the final decoration. This level of finish is not recommended where smooth painted surfaces, or light to medium weight wall coverings as specified.
      4) Level 4: For surfaces receiving wall covering and flat paints.
      5) Level 5: For surfaces receiving gloss or semigloss paint and surfaces subjected to severe lighting. To be used in Kitchen areas and food service areas only.
   d. Glass Mat Gypsum Sheathing Board: Finish according to manufacturer's written instructions for use as exposed soffit board.
   e. Glass Mat Faced Panels: Finish according to manufacturer's written instructions.

H. Installation Tolerances:
1. Suspension System: Install suspension systems that are level to within 1/8 inch in 12 feet measured lengthwise on each member that will receive finishes and transversely

between parallel members that will receive finishes.

2. Installation Tolerances, Suspension System: Install suspension systems level to within 1/8 inch in 12 feet measured lengthwise on each member that will receive finishes and transversely between parallel members that will receive finishes.

3.5 PROTECTION

A. Protect installed products from damage from weather, condensation, direct sunlight, construction, and other causes during remainder of the construction period.

B. Remove and replace panels that are wet, moisture damaged, and mold damaged:
   1. Indications that panels are wet or moisture damaged include, but are not limited to, discoloration, sagging, or irregular shape.
   2. Indications that panels are mold damaged include, but are not limited to, fuzzy or splotchy surface contamination and discoloration.

END OF SECTION 09 29 00

SECTION 09 30 00 TILING

PART 1 GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section includes requirements including but not limited to:
   1. Ceramic mosaic tile.
   2. Accessories required for indicated installation.

B. Related Sections:
   1. Section 09 21 16: Gypsum Board Assemblies.
   2. Section 09 65 13.13: Resilient Base.

1.3 PERFORMANCE REQUIREMENTS

A. Static Coefficient of Friction:
   1. Level Surfaces: Minimum 0.6.
   2. Ramp Surfaces: Minimum 0.8.

B. Ceramic Tile Flooring should be stable, firm, and slip resistant, pursuant to 2022 CBC Section 11B-302.1.

1.4 SUBMITTALS

A. Product Data: Technical data including data sheets, installation recommendation, and recommended joint widths.

B. Shop Drawings - Show locations of each type of tile and tile pattern:
   1. Show widths, details, and locations of expansion, contraction, control, and isolation joints in tile substrates and finished tile surfaces.

C. Samples - Submit samples showing full range of color and texture variations expected:
   1. Full size units of each type and composition of tile and for each color and finish required.
   2. Assembled samples mounted on a rigid panel, with grouted joints, for each type and composition of tile and for each color and finish required; minimum 12 inches (300 mm) square, but not fewer than four tiles. Use grout of type and in color or colors approved for completed work.
   3. Waterproof membrane in 6 x 6-inch sample.
   4. Thresholds in 6-inch (150 mm) lengths.

D. Test Reports: Submit test reports from qualified independent testing laboratory indicating and interpreting test results relative to compliance of tile products with requirements for slip resistance.

E. Maintenance Instructions: Submit maintenance instructions for each type of product specified.

1.5 QUALITY ASSURANCE

A. Regulatory Requirements:
   1. Building Code: Comply with applicable requirements for the CBC for interior finishes.
   2. Surface Burning Characteristics - ASTM E84; identify products with appropriate markings of applicable testing agency:
      a. Flame Spread Index: 25 or less.
      b. Smoke Developed Index: 450 or less.
   3. Accessibility Requirements - Comply with applicable requirements:
      a. Americans with Disabilities Act of 1990, as amended:
         1) ADA Title II Regulations & the 2010 ADA Standards for Accessible Design.
      b. 2022 California Building Code (CBC) (CCR Title 24, Part 2, as adopted and amended by DSA):
         2) CBC Chapter 11B, Access to Public Buildings, Public Accommodations, Commercial Buildings and Public Housing.

B. Source Limitations for Tile: Obtain tile of same type and color or finish from one source or producer. Obtain tile from same production run and of consistent quality in appearance and physical properties for each contiguous area.

C. Source Limitations for Setting and Grouting Materials: Obtain ingredients of a uniform quality for each mortar, adhesive, and grout component from a single manufacturer and each aggregate from one source or producer.

D. Source Limitations for Other Products - Obtain each of the following products specified in this Section through one source from a single manufacturer for each product:
   1. Stone thresholds.
   2. Waterproofing.
   3. Joint sealants.
   4. Cementitious backer units.
   5. Metal edge strips.

E. Mockups:
   1. Build mockups to verify selections made under Sample submittals and to demonstrate aesthetic effects and set quality standards for materials and execution:
      a. Build mockup of each type of floor tile installation.
      b. Build mockup of each type of wall tile installation.
      c. Subject to compliance with requirements, approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.

1.6 DELIVERY, STORAGE, AND HANDLING

A. Deliver and store packaged materials in original containers with seals unbroken and labels intact until time of use. Comply with requirements in ANSI A137.1 for labeling tile packages.

B. Store tile and cementitious materials on elevated platforms, under cover, and in a dry location. Store aggregates where grading and other required characteristics can be maintained and contamination can be avoided. Store liquid materials in unopened containers and protected from freezing.

C. Handle tile that has temporary protective coating on exposed surfaces to prevent coated surfaces from contacting backs or edges of other units. If coating does contact bonding surfaces of tile, remove coating from bonding surfaces before setting tile.

PART 2 PRODUCTS

2.1 MATERIALS

A. ANSI Ceramic Tile Standard: Provide tile that complies with ANSI A137.1 for types, compositions, and other characteristics indicated. Provide tile complying with Standard grade requirements.

B. ANSI Standards for Tile Installation Materials: Provide materials complying with ANSI A108, ANSI standards referenced by TCNA installation methods specified in tile installation schedules, and other requirements specified.

C. Factory Blending: For tile exhibiting color variations within ranges, blend tile in factory and package so tile units taken from one package show same range in colors as those taken from other packages and match approved Samples.

D. Mounting:
   1. For factory mounted tile, provide back or edge mounted tile assemblies as standard with manufacturer unless otherwise indicated:
      a. Where tile is indicated for installation in swimming pools, on exteriors or in wet areas, do not use back- or edge-mounted tile assemblies unless tile manufacturer specifies in writing that this type of mounting is suitable for installation indicated and has a record of successful in-service performance.

2.2 TILE PRODUCTS

A. Manufacturers are subject to compliance with requirements; provide products by one of the following:
   1. Ceramic Tile:
      b. Arizona Tile.
      c. Crossville, Inc.
      d. Daltile.
      e. American Olean; a Division of Dal-Tile Corporation.
      f. Emser Tile.

B. Floor Tile – Porcelain tile **PT-1**
   1. Basis of Design Product/Manufacturer: **More Wood/Arizona Tile**.
   2. Type: TL-1.
   3. Module Size: 8 X 32
   4. Thickness: 10mm
   5. Surface: R11 Anti-Slip Finish
   6. Dynamic Coefficient of Friction: Not less than 0.42.
   7. Location: As indicated in the elevation (12/A7.2) and finish floor plan drawings/schedules (A10.1)
   8. Grout Color: Mapei 115 Truffle
   9. Tile color: Noce
   10. Installation Pattern: 33% Offset
   11. Trim: MT-1 Schluter Dilex-HKS Brushed Stainless Steel Cove Transition at Floor to Wall Tile Transition

C. Wall Tile – Porcelain tile **PT-2**
   1. Basis of Design Product/Manufacturer: **Themar/Arizona Tile.**
   2. Type: TL-1.
   3. Module Size: 12 x 24
   4. Thickness: 10mm
   5. Surface: Matte
   6. Dynamic Coefficient of Friction: Not less than 0.42.
   7. Location: As indicated in the elevation (12/A7.2) and finish floor plan

drawings/schedules (A10.1)
8. Grout Color: Mapei
9. Tile color: Venato Gold
10. Installation Pattern: 33% Offset
11. Trim: MT-2 Schluter Jolly Brushed Stainless-Steel Trim

D. Wall Tile – Porcelain tile **PT-3**
1. Basis of Design Product/Manufacturer: **Fragment (Fray)/Arizona Tile.**
2. Type: TL-1.
3. Module Size: 2 x 2 Mosaic
4. Thickness: 9mm
5. Surface: Matte
6. Dynamic Coefficient of Friction: Not less than 0.42.
7. Location: As indicated in the elevation (12/A7.2) and finish floor plan drawings/schedules (A10.1)
8. Grout Color: Mapei
9. Tile color: Gray
10. Installation Pattern: 33% Offset
11. Trim: MT-2 Schluter Jolly Brushed Stainless-Steel Trim

E. Ceramic Backsplash Tile - Glazed tile **CT-1**
1. Basis of Design Product/Manufacturer**: Paloma Long Hex / Arizona Tile.**
2. Composition: Ceramic tile.
3. Module Size: 4 x 8 Polished
4. Thickness: 9 mm.
5. Face: Plain with cushion edges.
6. Surface: Glossy
7. Base:
8. Tile Color and Pattern: Refer to Drawings.
9. Grout Color: Mapei grout – 02 Pewter
10. Trim: MT-2 Schluter Jolly Brushed Stainless-Steel Trim

F. Threshold - Fabricate to sizes and profiles indicated or required to provide transition between adjacent floor finishes:
1. Bevel edges at 1:2 slope, with lower edge of bevel aligned with or up to 1/16 inch (1.5 mm) above adjacent floor surface. Finish bevel to match top surface of threshold. Limit height of threshold to 1/2 inch (12.7 mm) or less above adjacent floor surface.
2. Granite Thresholds - ASTM C615/C615M, with polished finish:
   a. Description: Uniform, medium grained, black stone without veining.

2.3 WATERPROOF MEMBRANE

A. Waterproof membrane complies with ANSI A118 and is recommended by the manufacturer for the application indicated. Include reinforcement and accessories recommended by manufacturer.

B. Fluid Applied Membrane - Liquid latex rubber or elastomeric polymer:
1. Basis of Design - Laticrete 9235 Waterproofing Membrane. Subject to compliance with requirements, provide basis if design or comparable product by one of the following:
   a. Laticrete International, Inc.
   b. MAPEI Corporation.
   c. TEC; H.B. Fuller Construction Products Inc.

C. Fabric Reinforced, Fluid Applied Membrane - System consisting of liquid latex rubber or elastomeric polymer and continuous fabric reinforcement:

1. Basis of Design - Laticrete 9235 Waterproofing Membrane and reinforcing Fabric. Subject to compliance with requirements, provide basis if design or comparable product by one of the following:
   a. Laticrete International, Inc.
   b. MAPEI Corporation.
   c. Merkrete by Parex USA, Inc.

D. Latex Portland Cement Waterproof Mortar - Flexible, waterproof mortar consisting of cement based mix and latex additive:
   1. Manufacturers are subject to compliance with requirements; provide products by one of the following:
      a. C-Cure.
      b. MAPEI Corporation.
      c. TEC; H.B. Fuller Construction Products Inc.

E. Liquid Latex Waterproofing/Crack Isolation Membrane - Single Component, self-curing, load bearing liquid rubber polymer that forms a flexible seamless combined waterproofing membrane and crack isolation membrane compliance with ANSI A118:
   1. Basis of Design - Hydroban by Laticrete International. Subject to compliance with requirements, provide basis of design or comparable product by one of the following:
      a. Laticrete International, Inc.
      b. MAPEI Corporation.
      c. TEC; H.B. Fuller Construction Products Inc.

2.4 CRACK ISOLATION MEMBRANE

A. Crack isolation membrane complying with ANSI A118 for standard performance and recommended by manufacturer for the application indicated. Include reinforcement and accessories recommended by manufacturer.

B. Fabric Reinforced, Modified Bituminous Sheet - Self adhering, modified bituminous sheet with fabric reinforcement facing; 0.040-inch (1 mm) nominal thickness:
   1. Manufacturers are subject to compliance with requirements; provide products by one of the following:
      a. Custom Building Products.
      b. MAPEI Corporation.

C. Fluid Applied Membrane - Liquid latex rubber or elastomeric polymer:
   1. Manufacturers are subject to compliance with requirements; provide products by one of the following:
      a. Custom Building Products.
      b. Laticrete International, Inc.
      c. MAPEI Corporation.
      d. Merkrete by Parex USA, Inc.
      e. TEC; H.B. Fuller Construction Products Inc.

D. Fabric Reinforced, Fluid Applied Membrane - System consisting of liquid latex rubber or elastomeric polymer and fabric reinforcement:
   1. Manufacturers are subject to compliance with requirements; provide products by one of the following:
      a. Bonsal American, an Oldcastle company.
      b. Bostik, Inc.
      c. Custom Building Products.
      d. Laticrete International, Inc.
      e. MAPEI Corporation.
      f. Merkrete by Parex USA, Inc.

2.5 SETTING MATERIALS

A. Dry Set Mortar (Thinset) - ANSI A108:
   1. Mortar Bed - Proportions of 1 part Portland Cement to 5 parts sand:
      a. Portland Cement: ASTM C150, Type 1.
      b. Sand: ASTM C144.
      c. Water: Potable.
   2. Manufacturers are subject to compliance with requirements; provide products by one of the following:
      a. Custom Building Products.
      b. Laticrete International, Inc.
      c. MAPEI Corporation.
   3. Wall Applications: Provide mortar complying with requirements for nonsagging mortar in addition to requirements in ANSI A108.

B. Modified Dry Set Mortar (Thinset) - ANSI A118:
   1. Manufacturers are subject to compliance with requirements; provide products by one of the following:
      a. Laticrete International, Inc.
      b. MAPEI Corporation.
      c. TEC; H.B. Fuller Construction Products Inc.
   2. Provide prepackaged, dry mortar mix combined with acrylic resin or styrene-butadiene-rubber liquid latex additive at site.
   3. Wall Applications: Provide mortar complying with requirements for nonsagging mortar in addition to requirements in ANSI A118.

C. Improved Modified Dry Set Mortar (Thinset) - ANSI A118:
   1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
      a. Laticrete International, Inc.
      b. MAPEI Corporation.
      c. TEC; H.B. Fuller Construction Products Inc.
   2. Provide prepackaged, dry mortar mix combined with acrylic resin or styrene-butadiene-rubber liquid latex additive at Project site.
   3. For wall applications, provide mortar complying with requirements for nonsagging mortar in addition to the other requirements in ANSI A118.

D. Modified Dry Set Mortar (Medium Bed): ANSI A118; product approved by manufacturer for application thickness of 5/8 inch (16 mm).
   1. Manufacturers are subject to compliance with requirements; provide products by one of the following:
      a. Laticrete International, Inc.
      b. MAPEI Corporation.
      c. TEC; H.B. Fuller Construction Products Inc.
   2. Provide prepackaged, dry mortar mix combined with acrylic resin or styrene-butadiene-rubber liquid latex additive at Project site.

E. Portland Cement Mortar (Thickset) Installation Materials - ANSI A108:
   1. Mortar Bed - Proportions of 1 part Portland Cement to 5 parts sand:
      a. Portland Cement: ASTM C150, Type 1.
      b. Sand: ASTM C144.
      c. Water: Potable.
   2. Cleavage Membrane: Asphalt felt, ASTM D226/D226M, Type I (No. 15); or polyethylene sheeting, ASTM D4397, 4.0 mils (0.1 mm) thick.
   3. Reinforcing Wire Fabric: Galvanized, welded-wire fabric, 2 by 2 inches (50.8 by 50.8 mm) by 0.062-inch (1.57 mm) diameter; comply with ASTM A1064, except for

minimum wire size.
4. Expanded Metal Lath - Diamond mesh lath complying with ASTM C847:
   a. Base Metal and Finish for Interior Applications: Uncoated or zinc-coated (galvanized) steel sheet, with uncoated steel sheet painted after fabrication into lath.
   b. Base Metal and Finish for Exterior Applications: Zinc coated (galvanized) steel sheet.
   c. Configuration over Studs and Furring: Flat.
   d. Configuration over Solid Surfaces: Self furring.
   e. Weight: 3.4 lb/sq. yd. (1.8 kg/sq. m).
5. Latex Additive: Styrene-butadiene-rubber water emulsion, serving as replacement for part or all of gaging water, of type specifically recommended by latex additive manufacturer for use with field mixed portland cement and aggregate mortar bed.

F. Tile Setting Epoxy - ANSI A118, water cleanable; 100 percent solids epoxy grout:
1. Manufacturers are subject to compliance with requirements; provide products by one of the following:
   a. Polyblend Tile Grout with 100% Solids Epoxy; Custom Building Products.
   b. SpectraLOCK PRO Stainless Grout; Laticrete International, Inc.
2. Provide product capable of withstanding continuous and intermittent exposure to temperatures of up to 140 degrees F and 212 degrees F (60 degrees C and 100 degrees C), respectively, and certified by manufacturer for intended use.
3. Color: Selected by Architect.

G. EGP (Exterior Glue Plywood) Latex-Portland Cement Mortar (Thinset) - ANSI A118:
1. Manufacturers are subject to compliance with requirements; provide products by one of the following:
   a. Laticrete International, Inc.
   b. MAPEI Corporation.
   c. TEC; H.B. Fuller Construction Products Inc.
2. Provide prepackaged, dry mortar mix combined with acrylic resin or styrene-butadiene-rubber liquid latex additive at Project site.

2.6 GROUT MATERIALS

A. Sand Portland Cement Grout - ANSI A108, consisting of white or gray cement and white or colored aggregate as required to produce color indicated:
1. Portland Cement: ASTM C150, Type 1.
2. Lime: ASTM C206, Type S.
3. Sand: ASTM C144.

B. Commercial Cement Grout (Sanded Grout) - ANSI A118 for joints 1/8 inch (3.2 mm) or wider:
1. Manufacturers are subject to compliance with requirements; provide products by one of the following:
   a. Custom Building Products.
   b. Laticrete International, Inc.
2. Polymer Type: Acrylic resin or styrene-butadiene rubber in liquid latex form for addition to prepackaged dry grout mix.

C. High Performance Tile Grout - ANSI A118:
1. Manufacturers are subject to compliance with requirements; provide products by one of the following:
   a. Custom Building Products.
   b. Laticrete International, Inc.
2. Polymer Type: Acrylic resin or styrene-butadiene rubber in liquid latex form for addition

to prepackaged dry grout mix.

D. Grout for Pregrouted Tile Sheets: Same product used in factory to pregrout tile sheets.

E. Water Cleanable Epoxy Grout - ANSI A118:
1. Manufacturers are subject to compliance with requirements; provide products by one of the following:
   a. Polyblend Tile Grout with 100% Solids Epoxy; Custom Building Products.
   b. SpectraLOCK PRO Stainless Grout; Laticrete International, Inc.
   c. MAPEI Corp., Kerapoxy or Kerapoxy CQ Epoxy Grout.
2. Provide product capable of withstanding continuous and intermittent exposure to temperatures of up to 140 degrees F and 212 degrees F (60 degrees and 100 degrees C), respectively, and certified by manufacturer for intended use.

2.7 MISCELLANEOUS MATERIALS

A. Trowelable Underlayments and Patching Compounds: Latex modified, portland cement-based formulation provided or approved by manufacturer of tile setting materials for installations indicated.

B. Vapor Retarder Membrane: Polyethylene sheeting, ASTM D4397, 4.0 mils (0.1 mm) thick.

C. Metal Edge Strips:
1. Angle or L-shaped, height to match tile and setting bed thickness, metallic or combination of metal and PVC or neoprene base, designed specifically for flooring applications; stainless steel, ASTM A666, 300 Series exposed edge material.
   a. Manufacturers are subject to compliance with requirements; provide products by one of the following:
      1) Blanke Corporation.
      2) Ceramic Tool Company, Inc.
      3) Schluter Systems L.P.

D. Tile Cleaner: A neutral cleaner capable of removing soil and residue without harming tile and grout surfaces, specifically approved for materials and installations indicated by tile and grout manufacturers.

E. Tile and Grout Sealer - Sealer for sealing grout joints and that does not change color or appearance of grout:
1. Manufacturers are subject to compliance with requirements; provide products by one of the following:
   a. Custom Building Products.
   b. Summitville Tiles, Inc.
   c. TEC; H.B. Fuller Construction Products Inc.

F. Sealant: Silicone sealant; refer to Section 07 92 00.

2.8 MIXING MORTARS AND GROUT

A. Mix mortars and grouts to comply with referenced standards and mortar and grout manufacturers' written instructions.

B. Add materials, water, and additives in accurate proportions.

C. Obtain and use type of mixing equipment, mixer speeds, mixing containers, mixing time, and other procedures to produce mortars and grouts of uniform quality with optimum

performance characteristics for installations indicated.

PART 3 EXECUTION

3.1 PROJECT CONDITIONS

A. Environmental Limitations: Do not install tile until construction in spaces is complete and ambient temperature and humidity conditions are maintained at the levels indicated in referenced standards and manufacturer's written instructions.

B. Contractor is required to achieve the specified concrete moisture content prior to installation of all flooring materials or use a flooring manufacture approved moisture barrier prior to installation of all flooring products.

C. Maintain temperatures at 50 degrees F or more in tiled areas during installation and for 7 days after completion, unless higher temperatures are required by referenced installation standard or manufacturer's instructions.

3.2 EXTRA MATERIALS

A. Furnish extra materials that match and are from same production runs as products installed and that are packaged with protective covering for storage and identified with labels describing contents:
   1. Tile and Trim Units: Furnish quantity of full size units equal to 3 percent of amount installed for each type, composition, color, pattern, and size indicated.
   2. Grout: Furnish quantity of grout equal to 3 percent of amount installed for each type, composition, and color indicated.

3.3 EXAMINATION

A. Examine substrates, areas, and conditions where tile will be installed for compliance with requirements for installation tolerances and other conditions affecting performance of the work:
   1. Verify substrates for setting tile are firm; dry; clean; free of coatings that are incompatible with tile setting materials, including curing compounds and other substances that contain soap, wax, oil, or silicone; and comply with flatness tolerances required by ANSI A108 for installations indicated.
   2. Verify concrete substrates for tile floors installed with thinset mortar comply with surface finish requirements in ANSI A108 for installations indicated:
      a. Verify surfaces that received a steel trowel finish have been mechanically scarified.
      b. Verify protrusions, bumps, and ridges have been removed by sanding or grinding.
   3. Verify installation of grounds, anchors, recessed frames, electrical and mechanical units of work, and similar items located in or behind tile has been completed.
   4. Verify joints and cracks in tile substrates are coordinated with tile joint locations; if not coordinated, adjust joint locations in consultation with Architect.

B. Proceed with installation after correcting unsatisfactory conditions.

3.4 PREPARATION

A. Fill cracks, holes, and depressions in concrete substrates for tile floors installed with adhesives or thinset mortar with trowelable leveling and patching compound specifically recommended by tile-setting material manufacturer.

B. Where indicated, prepare substrates to receive waterproofing by applying a reinforced

mortar bed that complies with ANSI A108 and is sloped 1/4 inch per foot (1:50) toward drains.

C. Blending: For tile exhibiting color variations, verify tile has been factory blended and packaged so tile units taken from one package show same range of colors as those taken from other packages and match approved Samples. If not factory blended, either return to manufacturer or blend tiles at site before installing.

3.5 INSTALLATION

A. Comply with TCNA *Handbook for Ceramic, Glass, and Stone Tile Installation* for TCNA installation methods specified in tile installation schedules. Comply with parts of the ANSI A108 series *Specifications for Installation of Ceramic Tile* that are referenced in TCNA installation methods, specified in tile installation schedules, and apply to types of setting and grouting materials used:
   1. For the following installations, comply with ANSI A108 series procedures for tile installation standards for providing 95 percent mortar coverage:
      a. Exterior tile floors.
      b. Tile floors in wet areas.
      c. Tile floors consisting of tiles 8 by 8 inches (200 by 200 mm) or larger.
      d. Tile floors consisting of rib-backed tiles.

B. Extend tile work into recesses and under or behind equipment and fixtures to form complete covering without interruptions unless otherwise indicated. Terminate work neatly at obstructions, edges, and corners without disrupting pattern or joint alignments.

C. Accurately form intersections and returns. Perform cutting and drilling of tile without marring visible surfaces. Carefully grind cut edges of tile abutting trim, finish, or built-in items for straight aligned joints. Fit tile closely to electrical outlets, piping, fixtures, and other penetrations so plates, collars, or covers overlap tile.

D. Provide trim shapes where necessary to eliminate exposed tile edges.

E. Where accent tile differs in thickness from field tile, vary setting bed thickness so tiles are flush.

F. Jointing Pattern:
   1. Lay tile in grid pattern unless otherwise indicated. Lay out tile work and center tile fields in both directions in each space or on each wall area. Lay out tile work to minimize the use of pieces that are less than half of a tile. Provide uniform joint widths unless otherwise indicated:
      a. For tile mounted in sheets, make joints between tile sheets same width as joints within tile sheets so joints between sheets are not apparent in finished work.
      b. Where adjoining tiles on floor, base, walls, or trim are specified or indicated to be same size, align joints.
      c. Where tiles are specified or indicated to be whole integer multiples of adjoining tiles on floor, base, walls, or trim, align joints unless otherwise indicated.

G. Joint Widths - Unless otherwise indicated, install tile with the following joint widths:
   1. Ceramic Mosaic Tile: 1/8 inch (3.2 mm).

H. Lay out tile wainscots to dimensions indicated or to next full tile beyond dimensions indicated.

I. Expansion Joints:

1. Provide expansion joints and sealant filled joints, including control, contraction, and isolation joints, where indicated. Form joints during installation of setting materials, mortar beds, and tile. Do not saw cut joints after installing tiles:
    a. Where joints occur in concrete substrates, locate joints in tile surfaces directly above them.

J. Thresholds:
1. Install stone thresholds in same type of setting bed as adjacent floor unless otherwise indicated:
    a. At locations where mortar bed (thickset) would otherwise be exposed above adjacent floor finishes, set thresholds in modified dry set mortar (thinset).
    b. Do not extend cleavage membrane waterproofing or crack isolation membrane under thresholds set in standard dry set, modified dry set or improved modified dry set mortar. Fill joints between such thresholds and adjoining tile set on cleavage membrane, waterproofing, or crack isolation membrane with elastomeric sealant.

K. Metal Edge Strips: Install where exposed edge of tile flooring meets carpet, wood, or other flooring that finishes flush with top of tile.

L. Floor Sealer: Apply floor sealer to grout joints according to floor sealer manufacturer's written instructions. As soon as floor sealer has penetrated grout joints, remove excess sealer and sealer from tile faces by wiping with soft cloth.

M. Waterproofing:
1. Install waterproofing to comply with ANSI A108 and manufacturer's written instructions to produce waterproof membrane of uniform thickness that is bonded securely to substrate:
    a. Allow waterproofing to cure and verify by testing that it is watertight before installing tile or setting materials over it.

N. Crack Isolation Membrane:
1. Install crack isolation membrane to comply with ANSI A108 and manufacturer's written instructions to produce membrane of uniform thickness that is bonded securely to substrate:
    a. Allow crack isolation membrane to cure before installing tile or setting materials over it.

O. Floor and Paver Tile and Planks - Install tile to comply with requirements in the TCNA installation methods and ANSI A108 series of tile installation standards:
1. Back Buttering - For installations indicated, obtain 100 percent mortar coverage by complying with applicable special requirements for back buttering of tile in referenced ANSI A108 series of tile installation standards:
    a. Exterior tile floors.
    b. Tile floors in wet areas, including showers, tub enclosures, laundries, and swimming pools.
    c. Tile floors composed of tiles 8 inches by 8 inches (203 mm by 203 mm) or larger.
    d. Tile floors composed of rib backed tiles.

P. Floor Tile - Install tile to comply with requirements in the TCNA installation methods and ANSI A108 series of tile installation standards:
1. Back Buttering - For installations indicated, obtain 100 percent mortar coverage by complying with applicable special requirements for back buttering of tile in referenced ANSI A108 series of tile installation standards:
    a. Exterior tile floors.
    b. Tile floors in wet areas, including showers, tub enclosures, laundries, and swimming pools.

c. Tile floors composed of tiles 8 inches by 8 inches (203 mm by 203 mm) or larger.
d. Tile floors composed of rib backed tiles.

2. Tile Installation Method:
   a. Interior Floor Installations, Concrete Subfloor:
      1) TCNA F125-Full; thinset mortar on crack isolation membrane.

Q. Wall Tile Installation:
1. Install types of tile designated for wall installations to comply with requirements, including those referencing TCNA installation methods and ANSI setting bed standards:
   a. Back Buttering - For installations indicated, obtain 100 percent mortar coverage by complying with applicable special requirements for back buttering of tile in referenced ANSI A108 series of tile installation standards:
      1) Exterior tile wall installations.
      2) Tile wall installations in wet areas, including showers, tub enclosures, laundries, and swimming pools.
      3) Tile installed with chemical resistant mortars and grouts.
      4) Tile wall installations composed of tiles 8 inches by 8 inches (203 mm by 203 mm) or larger.
   a. Tile Installation Method, Wood or Metal Studs:
      1) TCNA W245; thinset mortar on glass-mat, water-resistant gypsum backer board.

3.6 ADJUSTING AND CLEANING

A. Remove and replace tile that is damaged or that does not match adjoining tile. Provide new matching units, installed as specified and in a manner to eliminate evidence of replacement.

B. Cleaning:
1. On completion of placement and grouting, clean all ceramic tile surfaces so they are free of foreign matter:
   a. Remove grout residue from tile as soon as possible.
   b. Clean grout smears and haze from tile according to tile and grout manufacturer's written instructions but no sooner than 10 days after installation. Use only cleaners recommended by tile and grout manufacturers and only after determining that cleaners are safe to use by testing on samples of tile and other surfaces to be cleaned. Protect metal surfaces and plumbing fixtures from effects of cleaning. Flush surfaces with clean water before and after cleaning.

3.7 PROTECTION

A. Protect installed tile work with kraft paper or other heavy covering during construction period to prevent staining, damage, and wear. If recommended by tile manufacturer, apply coat of neutral protective cleaner to completed tile walls and floors.

B. Prohibit foot and wheel traffic from tiled floors for at least seven days after grouting is completed.

C. Before final inspection, remove protective coverings and rinse neutral protective cleaner from tile surfaces.

END OF SECTION 09 30 00

SECTION 09 30 50 TILE SETTING MATERIALS AND ACCESSORIES

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Uncoupling membrane.

B. Waterproofing Membrane.

C. Floor drain, with integrated bonding flange.

D. Prefabricated shower components.

E. Setting materials.

1.2 RELATED SECTIONS

A. Section 03 30 00 - Cast-in-Place Concrete.

B. Section 05 55 00 - Metal Stair Treads and Nosings.

C. Section 06 10 00 - Rough Carpentry.

D. Section 07 90 00 - Joint Protection.

E. Section 09 28 13 - Cementitious Backing Boards.

F. Section 09 30 00 - Tiling.

G. Section 09 30 00 - Tiling. Shower trays, curbs, ramps, bench, niche, sealing compound, waterproofing membrane, drainage panels, drainage membrane compatible with floor drains.

H. Section 10 26 13 - Corner Guards.

I. Section 22 13 19.13 - Sanitary Drains.

J. Section 08 90 00 - Radiant Heating Units.

1.3 REFERENCES

A. CSA B79-08: Floor, Area, and Shower Drains, and Cleanouts for Residential Construction.

B. IAPMO IGC 195: Interim Guide Criteria for Floor Drain with Integrated Bonding Flange.

C. Tile Council of North America (TCNA) Handbook for Ceramic Tile Installation.

D. Terrazzo, Tile and Marble Association of Canada (TTMAC) Specification Guide 09300 Tile Installation Manual.

E. American National Standard Specifications for the installation of ceramic tile A108 / A118 / A136.1.

1.4 SUBMITTALS

A. Submit under provisions of Section 01 30 00.

B. Product Data: Manufacturer's data sheets on each product to be used, including:

1. Preparation instructions and recommendations.
2. Storage and handling requirements and recommendations.
3. Installation methods.

C. Verification Samples: For each finish product specified, two samples, minimum size 6 inches (150 mm) long, representing actual product, color, and finish.

D. Manufacturer's Certificates: Certify products meet or exceed specified requirements.

E. Warranty document showing duration and scope to be submitted with product submittals.

1.5 QUALITY ASSURANCE

A. Installer Qualifications: Company specializing in performing the work of this section with a minimum of five years' experience.

B. Source Limitations for Setting Materials and Accessories: Obtain product of a uniform quality for each application condition from a single manufacturer.

C. Mock-Up: Provide a mock-up for evaluation of surface preparation techniques and application workmanship.
1. Finish areas designated by Architect.
2. Do not proceed with remaining work until workmanship, color, and sheen are approved by Architect.
3. Refinish mock-up area as required to produce acceptable work.

D. Preinstallation Conference: Conduct conference at the Project site.
1. Convene one week prior to commencing work of this section.
2. Require attendance of installation material manufacturer, tile supplier, tile installer and installers of related work. Review installation procedures and coordination required with related work.
3. Meeting agenda includes but is not limited to:
a. Surface preparation.
b. Tile and installation material compatibility.
c. Manufacturer and installer warranty duration and scope covered by warranty.
d. Edge protection, transition, and prefabricated movement joint profiles.
e. Waterproofing techniques.
f. Crack isolation techniques.

1.6 DELIVERY, STORAGE, AND HANDLING

A. Store products in manufacturer's unopened packaging until ready for installation.

B. Protect materials from exposure to moisture. Do not deliver until after wet work is complete and dry.

C. Store materials in a dry, warm, ventilated weathertight location.

1.7 PROJECT CONDITIONS

A. Maintain environmental conditions (temperature, humidity, and ventilation) within limits recommended by manufacturer for optimum results. Do not install products under environmental conditions outside the manufacturer’s absolute limits.

1.8 WARRANTY

A. Acknowledge warranty duration and scope covered by warranty.

B. Coordinate Work with other operations and installation of floor finish materials to avoid damage to installed materials.

C. Obtain products of a uniform quality for each premanufactured tile profile, and mortar and waterproofing and uncoupling membrane from a single manufacturer, to maintain the installation system and provide multi-product warranty from selected manufacturer.

1.9 COORDINATION

A. Coordinate Work with other operations and installation of floor finish materials to avoid damage to installed materials.

PART 2 PRODUCTS

2.1 MANUFACTURERS

A. Acceptable Manufacturer: Schluter Systems L.P., which is located at: 194 Pleasant Ridge Road.; Plattsburgh, NY 12901-5841; Mary e. Yocum, 714-329-0355, myocum@schluter.com Web:www.schluter.com/schluter-us/en_US/.

2.2 UNCOUPLING MEMBRANE

A. Project specific warranty to be provided by Schluter Systems L.P. by Tile Contractor.

B. Schluter-DITRA: 1/8 inch (3 mm) thick, orange, high-density polyethylene membrane.
1. Grid Structure: 1/2 x 1/2 inch (12 x 12 mm) square cavities, each cut back in a dovetail configuration.
2. Anchoring Fleece: Polypropylene laminated to its underside.
3. Standards Compliance:
a. Conforms to definition for uncoupling membranes in the Tile Council of North America Handbook for Ceramic Tile Installation.
b. Meets or exceeds the requirements of the "American national standard specifications for load bearing, bonded, waterproof membranes for thin-set ceramic tile and dimension stone installation A118.10.
c. Listed by cUPC and is evaluated by ICC-ES. See Report No. ESR-2467.
4. Waterproofing Seaming Membrane: KERDI BAND Seams and Corners. Material to be 0.004 inch (0.1 mm) thick, orange polyethylene membrane, with polypropylene fleece laminated on both sides.

C. Schluter-KERDI-BAND: Seams and Corners material to be 0.004 inch (0.1 mm) thick, orange polyethylene membrane, with polypropylene fleece laminated on both sides. Width: As required.

2.3 WATERPROOFING MEMBRANE

A. Project specific warranty to be provided by Schluter Systems L.P. by Tile Contractor.

B. Schluter-KERDI: Polyethylene Membrane: 0.008 inch (0.2 mm) thick, orange with polypropylene fleece laminated on both sides.
1. Meets or exceeds requirements of the "American national standard specifications for load bearing, bonded, waterproof membranes for thin-set ceramic tile and dimension stone installation A118.10.
2. Listed by cUPC.
3. Evaluated by ICC-ES. See Report No. ESR-2467.
4. Corners and seals: Matching preformed inside corners. Color: Orange.
5. Corners and seals: Matching preformed outside corners. Color: Orange.
6. Corners and seals: Matching preformed pipe seals. Color: Orange.
7. Corners and seals: Matching preformed mixing valve seals. Color: Orange.

C. Schluter-KERDI-BAND: Seams and Corners material to be 0.004 inch (0.1 mm) thick, orange polyethylene membrane, with polypropylene fleece laminated on both sides. Width: As required.

D. Schluter-KERDI-FIX: Single-component, elastomeric, waterproof sealing, and bonding compound with a silane-modified polymer base. Compound is free of solvents and odorless.
   1. Color: To be determined.

2.4 SETTING MATERIALS

A. Schluter-ALL SET Modified Thin Set Mortar: Specialized sag-resistant modified thin-set mortar specifically formulated for use with Schluter membranes and boards. Engineered for use both under and over DITRA and KERDI products. Suitable for use with ceramic, porcelain, and stone tile, including large and heavy tile, in conjunction with Schluter-Systems' uncoupling and waterproofing membranes. Meets the requirements of ANSI A118.4T, A118.11, and A118.15T.
   1. Color: To be determined.

PART 3 EXECUTION

3.1 EXAMINATION

A. Do not begin installation until substrates have been properly prepared.

B. If substrate preparation is the responsibility of another installer, notify Architect of unsatisfactory preparation before proceeding.

3.2 PREPARATION

A. Clean surfaces thoroughly prior to installation.

B. Prepare surfaces using the methods recommended by the manufacturer for achieving the best result for the substrate under the project conditions.

3.3 INSTALLATION

A. Install in accordance with manufacturer's instructions.

3.4 PROTECTION

A. Protect installed products until completion of project.

B. Touch-up, repair or replace damaged products before Substantial Completion.

END OF SECTION 09 30 50

SECTION 09 51 00 ACOUSTICAL CEILING PANELS

PART 1 GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section includes requirements including but not limited to:
   1. Acoustical panels.
   2. Concealed and exposed suspension systems for ceilings.
   3. Ceiling panel for food service area.
   4. Accessories necessary for a complete installation.

1.3 SUBMITTALS

A. Product Data: Technical data for each product including installation instructions.

B. Samples:
   1. Acoustic Panel: Set of 6-inch (150 mm) square samples of each type, color, pattern, and texture.
   2. Exposed Suspension System Members, Moldings, and Trim: Set of 12-inch (300 mm) long samples of each type, finish, and color.

C. Coordination Drawings:
   1. Reflected ceiling plans, drawn to scale, on which the following items are shown and coordinated with each other, using input from installers of the items involved:
      a. Suspended ceiling components.
      b. Structural members to which suspension systems will be attached.
      c. Size and location of initial access modules for acoustical panels.
      d. Items penetrating finished ceiling including but not limited to the following:
         1) Lighting fixtures.
         2) Air outlets and inlets.
         3) Speakers.
         4) Sprinklers.
         5) Access panels.
      e. Perimeter moldings.

D. Maintenance Data: Manufacturer data for finishes for inclusion in maintenance manuals.

E. Submit one copy of ICC-ES Reports.

1.4 QUALITY ASSURANCE

A. Regulatory Requirements:
   1. Building Code:
      a. Comply with applicable requirements of the California Building Code (CBC) for interior finishes:
         1) DSA Interpretation of Regulations – IR 25-2.13 Metal Suspension Systems for Lay-in Panel Ceilings.
         2) California Building Code.

3) Chapter 19, California Building Code.
4) Chapter 23, California Building Code.
5) Acoustical Panel Standard: ASTM E1264 and designated by type, form, pattern, acoustical rating, and light reflectance:
   a) Mounting Method for Measuring NRC: Plenum mounting in which face of test specimen is 15-3/4 inches (400 mm) away from test surface according to ASTM E795.

2. Surface Burning Characteristics:
   a. Ceiling panels with surface burning characteristics complying with CBC and ASTM E1264 for Class A materials determined by testing identical products in accordance with ASTM E84:
      1) Flame Spread Index: 25 or less.
      2) Smoke Developed Index: 450 or less.
3. Seismic Performance: Acoustical ceiling shall withstand the effects of earthquake motions determined according to ASCE 7.
4. Fire Resistance Ratings: Comply with ASTM E119; testing by qualified testing agency. Identify products with appropriate markings of applicable testing agency. Indicate design designations from UL *Fire Resistance Directory* or from the listings of another qualified testing agency.

B. Source Limitations:
   1. Acoustical Ceiling Panel: Obtain each type through one source from a single manufacturer.
   2. Suspension System: Obtain each type through one source from a single manufacturer.

C. Comply with applicable regulations regarding toxic and hazardous materials:
   1. Coating Based Antimicrobial Treatment: Provide acoustical panels with face and back surfaces coated with antimicrobial treatment; and showing no mold or mildew growth when tested in accordance with ASTM D3273.
   2. Panel Based Antimicrobial Treatment: Provide acoustical panels manufactured with antimicrobial treatment in the panels.

D. Pre-installation Conference: Conduct conference at site.

1.5 WARRANTY

A. Standard Ceiling Panels: Warrant ceiling panels to be free from sagging, warping, shrinking, buckling, or delaminating as a result of manufacturing defects for a period of one (1) year from the date of Substantial Completion.

B. Sag Resistant Ceiling Panels: warrant products to be free from sagging, warping, shrinking, buckling, or delaminating as a result of manufacturing defects for a period of ten (10) years from the date of Substantial Completion.

C. Standard Suspension System: Suspension systems shall be warranted to be free from defects in material or factory workmanship and shall not incur 50 percent red rust as defined by ASTM B117 test procedures for a period of ten (10) years from the date of Substantial Completion.

D. Suspension system / ceiling panels: Provide manufacturers standard 15 year warranty for suspension systems when used in combination with same manufacturers sag resistant ceiling panels. Ceiling panels to be free from sagging, warping, shrinking, buckling, or delaminating as a result of manufacturing defects. Suspension systems shall not incur 50 percent red rust as defined by ASTM B117 test during the period of the warranty, extra materials.

1.6 DELIVERY, STORAGE, AND HANDLING

A. Deliver acoustical panels, suspension system components, and accessories to site in original, unopened packages and store in a fully enclosed, conditioned space protected against damage from moisture, humidity, temperature extremes, direct sunlight, surface contamination, and other causes.

B. Before installing acoustical panels, allow panels to attain room temperature and a stabilized moisture content.

C. Handle acoustical panels carefully to avoid chipping edges or damaging units in any way.

PART 2 PRODUCTS

2.1 MATERIALS

A. Manufacturers are subject to compliance with requirements; provide ceiling panels and grid systems by one of the following:
   1. Concealed and Exposed Suspension Grid:
      a. Armstrong World Industries, Inc.
      b. CertainTeed Corporation.
      c. Chicago Metallic; Rockfon (Roxul Inc.).
      d. Hunter Douglas.
      e. USG Interiors.
   2. Acoustical Ceiling Panel:
      a. Armstrong World Industries, Inc.
      b. CertainTeed Corporation.
      c. Rockfon (Roxul Inc.).
      d. Tectum Inc.
      e. USG Interiors.
   3. Molding and Edge Trim:
      a. Armstrong World Industries, Inc.
      b. CertainTeed Corp.
      c. Chicago Metallic Corporation.
      d. Fry Reglet Corporation.
      e. Gordon, Inc.
      f. USG Interiors, Inc.; Subsidiary of USG Corporation.
   4. Acoustical Sealant for Exposed and Concealed Joints:
      a. Pecora Corporation; AC-20 FTR Acoustical and Insulation Sealant.
      b. USG Corporation; SHEETROCK Acoustical Sealant.
   5. Acoustical Sealant for Concealed Joints:
      a. Henkel Corporation; OSI Pro-Series SC-175 Acoustical Sound Sealant.
      b. Pecora Corporation; AIS-919.

B. Acoustical Panel Colors and Patterns:
   1. Match appearance characteristics indicated for each product type:
      a. Where appearance characteristics of acoustical panels are indicated by referencing pattern designations in ASTM E1264 and not manufacturers' proprietary product designations, provide products selected by Architect that comply with requirements indicated for type, pattern, color, light reflectance, acoustical performance, edge detail, and size.

2.2 METAL SUSPENSION SYSTEM

A. Metal Suspension System:

1. Direct hung metal suspension systems of types, structural classifications, and finishes indicated complying with applicable requirements in ASTM C635/C635M:
   a. High Humidity Finish:
      1) Comply with ASTM C635/C635M requirements for Coating Classification for Severe Environment Performance where high humidity finishes are indicated.
   b. Attachment Devices - Size for five times the design load indicated in ASTM C635/C635M, Table 1 Direct Hung, unless otherwise indicated. Comply with seismic design requirements:
      1) Anchors in Concrete: Anchors of type and material indicated below, with holes or loops for attaching hangers of type indicated and with capability to sustain, without failure, a load equal to five times that imposed by ceiling construction, as determined by testing according to ASTM E488 or ASTM E1512 as applicable, conducted by a qualified testing and inspecting agency:
         a) Type: Cast in place, postinstalled expansion or postinstalled bonded anchors.
         b) Corrosion Protection: Carbon steel components zinc plated to comply with ASTM B633, Class Fe/Zn 5 (0.005 mm) for Class SC 1 service condition.
         c) Corrosion Protection: Stainless steel components complying with ASTM F593 and ASTM F594, Group 1 Alloy 304 or 316 for bolts; Alloy 304 or 316 for anchor.
         d) Corrosion Protection: Components fabricated from nickel copper alloy rods complying with ASTM B164 for UNS No. N04400 alloy.
      2) Power Actuated Fasteners in Concrete: Fastener system of type suitable for application indicated, fabricated from corrosion resistant materials, with clips or other accessory devices for attaching hangers of type indicated and with capability to sustain, without failure, a load equal to 10 times that imposed by ceiling construction, as determined by testing according to ASTM E1190, conducted by a qualified testing and inspecting agency.
2. Wire Hangers, Braces, and Ties:
   a. Zinc Coated, Carbon Steel Wire: ASTM A641/A641M, Class 1 zinc coating, soft temper.
   b. Stainless Steel Wire: ASTM A580/A580M, Type 304, nonmagnetic.
   c. Nickel Copper Alloy Wire: ASTM B164, nickel copper alloy UNS No. N04400.
   d. Size: Select wire diameter so its stress at three times hanger design load (ASTM C635/C635M, Table 1 Direct Hung) will be less than yield stress of wire, but provide not less than 0.106 inch (2.69 mm) diameter wire.
3. Hanger Rods and Flat Hangers: Mild steel, zinc coated or protected with rust inhibitive paint.
4. Angle Hangers: Angles with legs not less than 7/8 inch (22 mm) wide; formed with 0.04 inch (1 mm) thick, galvanized steel sheet complying with ASTM A653/A653M, G90 (Z275) coating designation; with bolted connections and 5/16 inch (8 mm) diameter bolts.
5. Hold Down Clips: Provide hold down clips spaced 24 inches (610 mm) o.c. on all cross tees in areas with exterior opening larger than 48” x 96”.
6. Impact Clips: Provide impact clip system designed to absorb impact forces against acoustical panels in Gymnasiums.
7. Aluminum cap for use over steel grid in kitchen areas or where shown on drawings or required.

B. Metal Suspension Systems:
   1. Wide Face, Steel Capped, Double Web, Steel Suspension System:
      a. Main and cross runners roll formed from cold rolled steel sheet; prepainted, electrolytically zinc coated, or hot dip galvanized according to ASTM A653/A653M, not less than G30 (Z90) coating designation; with prefinished 15/16 inch (24 mm)

wide metal caps on flanges:
1) Structural Classification: Heavy duty system.
2) Face Design: Flat, flush.
3) Cap Finish: Color selected by Architect.

2. Narrow Face, Steel Capped, Double Web, Steel Suspension System:
   a. Main and cross runners roll formed from cold rolled steel sheet; prepainted, electrolytically zinc coated, or hot dip galvanized according to ASTM A653/A653M, not less than G30 (Z90) coating designation; with prefinished, cold rolled, 9/16 inch (15 mm) wide metal caps on flanges:
      1) Structural Classification: Intermediate-duty system.
      2) Face Design: Flat, flush.
      3) Cap Finish: Color selected by Architect.

2.3 ACOUSTICAL PANELS

A. Acoustic Panel Type I:
1. Basis of Design Product: Ultima by Armstrong World Industries.
2. Classification - Provide panels complying with ASTM E1264 for type, form, and pattern:
   a. Type and Form: Type III, mineral base with painted finish; Form 2, water felted.
   b. Pattern: CE (perforated, small holes and lightly textured).
3. Color: White.
4. LR: Not less than 0.85.
5. NRC: Not less than 0.70.
6. CAC: Not less than **40**.
7. Edge/Joint Detail: Square.
8. Thickness: 3/4 inch (19 mm).
9. Modular Size: 24 by 24 inches (610 by 610 mm).
10. Broad Spectrum Antimicrobial Fungicide and Bactericide Treatment: Provide acoustical panels treated with antimicrobial formulation that inhibits fungus, mold, mildew, and gram-positive and gram-negative bacteria and showing no mold, mildew, or bacterial growth when tested according to ASTM D3273 and evaluated according to ASTM D3274 or ASTM G21.
11. Typical Location: Primary learning areas and classrooms.

2.4 MOLDING, TRIM AND ACCESSORIES

A. Shadow Molding: Where an acoustical lay in ceiling abuts a gypsum board ceiling in the same plane, provide a "W" shaped reveal or "shadow" molding similar to Armstrong Shadow Molding No. 7873.

B. Light Fixture Protection:
1. Manufacturer: Thermafiber Light Protection Kit by Owens Corning or Type 5/8 or 3/4 P(S) by Armstrong World Industries.
2. Fire Resistance Rating: Same as ceiling assembly rating.
3. Locations: At fixtures reinstalled in fire rated ceiling assemblies.

C. Roll Formed, Sheet Metal Edge Moldings and Trim:
1. Type and profile for standard moldings for edges and penetrations that comply with seismic design requirements; formed from sheet metal of same material, finish, and color used for exposed flanges of suspension system runners:
   a. Provide edge moldings that fit acoustical panel edge details and suspension systems indicated and that match width and configuration of exposed runners unless otherwise indicated.
   b. For lay in panels with reveal edge details, provide stepped edge molding that forms reveal of same depth and width as that formed between edge of panel and flange at exposed suspension member.

c. For circular penetrations of ceiling, provide edge moldings fabricated to diameter required to fit penetration exactly.

D. Extruded Aluminum Edge Moldings and Trim:
1. Where indicated, provide extruded aluminum edge moldings and trim of profile indicated or referenced by manufacturer's designations, including splice plates, corner pieces, and attachment and other clips, complying with seismic design requirements and the following:
a. Aluminum Alloy: Alloy and temper recommended by aluminum producer and finisher for type of use and finish indicated, and with not less than the strength and durability properties of aluminum extrusions complying with ASTM B221 for Alloy and Temper 6063-T5.
b. Clear Anodic Finish: AAMA 611, AA-M12C22A31, Class II, 0.010 mm or thicker.
c. Baked Enamel or Powder Coat Finish: Minimum dry film thickness of 1.5 mils (0.04 mm). Comply with ASTM C635/C635M and coating manufacturer's written instructions for cleaning, conversion coating, and applying and baking finish.

E. Acoustical Sealant:
1. Comply with ASTM C834 and effective in reducing airborne sound transmission through perimeter joints and openings in building construction as demonstrated by testing representative assemblies according to ASTM E90:
a. Exposed and Concealed Joints: Nonsag, paintable, nonstaining latex sealant.
b. Concealed Joints: Nondrying, nonhardening, nonskinning, nonstaining, gunnable, synthetic rubber sealant.

PART 3 EXECUTION

3.1 PROJECT CONDITIONS

A. Environmental Limitations:
1. Do not install acoustical panel ceilings until spaces are enclosed and weatherproof, wet work in spaces is complete and dry, work above ceilings is complete, and ambient temperature and humidity conditions are maintained at the levels indicated for Project when occupied for its intended use:
a. Pressurized Plenums: Operate ventilation system for not less than 48 hours before beginning acoustical panel ceiling installation.

3.2 EXTRA MATERIALS

A. Furnish extra materials matching products installed and packaged with protective covering for storage and identified with labels describing contents:
1. Acoustical Ceiling Panels: Full size panels equal to 2 percent of quantity installed.
2. Suspension System Components: Quantity of each exposed component equal to 2 percent of quantity installed.
3. Hold Down Clips: Equal to 2 percent of quantity installed.
4. Impact Clips: Equal to 2 percent of quantity installed.

3.3 EXAMINATION

A. Examine substrates, areas, and conditions, including structural framing to which acoustical panel ceilings attach or abut for compliance with requirements specified that affect ceiling installation and anchorage and with requirements for installation tolerances and other conditions affecting performance of acoustical panel ceilings.

B. Examine acoustical panels before installation. Reject acoustical panels that are wet,

moisture damaged, or mold damaged.

C. Proceed with installation after correcting unsatisfactory conditions.

3.4 PREPARATION

A. Measure each ceiling area and establish layout of acoustical panels to balance border widths at opposite edges of each ceiling. Avoid using less than half width panels at borders, and comply with layout shown on reflected ceiling plans.

3.5 INSTALLATION

A. Install acoustical panel ceilings to comply with ASTM C636/C636M and seismic design requirements indicated, according to manufacturer's written instructions and CISCA *Ceiling Systems Handbook*:
   1. Fire Rated Assembly: Install fire-rated ceiling systems according to tested fire rated design.

B. Suspend ceiling hangers from building's structural members and as follows:
   1. Install hangers plumb and free from contact with insulation or other objects within ceiling plenum that are not part of supporting structure or of ceiling suspension system.
   2. Splay hangers where required and, if permitted with fire resistance rated ceilings, to miss obstructions; offset resulting horizontal forces by bracing, countersplaying, or other equally effective means.
   3. Where width of ducts and other construction within ceiling plenum produces hanger spacings that interfere with location of hangers at spacings required to support standard suspension system members, install supplemental suspension members and hangers in form of trapezes or equivalent devices.
   4. Secure wire hangers to ceiling-suspension members and to supports above with a minimum of three tight turns. Connect hangers directly either to structures or to inserts, eye screws, or other devices that are secure and appropriate for substrate and that will not deteriorate or otherwise fail due to age, corrosion, or elevated temperatures.
   5. Secure flat, angle, channel, and rod hangers to structure, including intermediate framing members, by attaching to inserts, eye screws, or other devices that are secure and appropriate for both the structure to which hangers are attached and the type of hanger involved. Install hangers in a manner that will not cause them to deteriorate or fail due to age, corrosion, or elevated temperatures.
   6. Do not support ceilings directly from permanent metal forms or floor deck. Fasten hangers to cast in place hanger inserts, postinstalled mechanical or adhesive anchors, or power actuated fasteners that extend through forms into concrete.
   7. When steel framing does not permit installation of hanger wires at spacing required, install carrying channels or other supplemental support for attachment of hanger wires.
   8. Do not attach hangers to steel deck tabs.
   9. Do not attach hangers to steel roof deck. Attach hangers to structural members.
   10. Space hangers not more than 48 inches (1200 mm) o.c. along each member supported directly from hangers unless otherwise indicated; provide hangers not more than 8 inches (200 mm) from ends of each member.
   11. Size supplemental suspension members and hangers to support ceiling loads within performance limits established by referenced standards and publications.

C. Secure bracing wires to ceiling suspension members and to supports with a minimum of four tight turns. Suspend bracing from building's structural members as required for hangers, without attaching to permanent metal forms, steel deck, or steel deck tabs. Fasten bracing wires into concrete with cast in place or postinstalled anchors.

D. Panel Accessibility: Install panels downward accessible by disengaging hinge support rail on

one side of panel from the T Bar Flange or optional A Mount rail flange without the use of tools, for access without removal of panel from the ceiling.

E. Install edge moldings and trim of type indicated at perimeter of acoustical ceiling area and where necessary to conceal edges of acoustical panels:
   1. Apply acoustical sealant in a continuous ribbon concealed on back of vertical legs of moldings before they are installed.
   2. Screw attach moldings to substrate at intervals not more than 16 inches (400 mm) o.c. and not more than 3 inches (75 mm) from ends, leveling with ceiling suspension system to a tolerance of 1/8 inch in 12 feet (3.2 mm in 3.6 m). Miter corners accurately and connect securely.
   3. Do not use exposed fasteners, including pop rivets, on moldings and trim.

F. Install suspension system runners so they are square and securely interlocked with one another. Remove and replace dented, bent, or kinked members.

G. Install acoustical panels with undamaged edges and fit accurately into suspension system runners and edge moldings. Scribe and cut panels at borders and penetrations to provide a neat, precise fit:
   1. Arrange directionally patterned acoustical panels with pattern running in one direction parallel to long axis of space.
   2. For square edged panels, install panels with edges fully hidden from view by flanges of suspension system runners and moldings.
   3. For reveal edged panels on suspension system runners, install panels with bottom of reveal in firm contact with top surface of runner flanges.
   4. For reveal edged panels on suspension system members with box shaped flanges, install panels with reveal surfaces in firm contact with suspension system surfaces and panel faces flush with bottom face of runners.
   5. Paint cut edges of panel remaining exposed after installation; match color of exposed panel surfaces using coating recommended in writing for this purpose by acoustical panel manufacturer.
   6. Install hold-down clips in areas indicated, in areas with exterior opening larger than 48” x 96”, where required by authorities having jurisdiction, and for fire resistance ratings; space as recommended by panel manufacturer's written instructions unless otherwise indicated.
   7. Install clean room gasket system in areas indicated, sealing each panel and fixture as recommended by panel manufacturer's written instructions.
   8. Protect lighting fixtures and air ducts to comply with requirements indicated for fire resistance rated assembly.

3.6 FIRE RATING SCHEDULE

A. Refer to UL Assemblies Drawings for Fire Rating requirements of ceiling materials at rated floor and roof assemblies.

3.7 FIELD QUALITY CONTROL

A. Special Inspections:
   1. Engage a qualified special inspector to perform the following special inspections:
      a. Compliance of seismic design.

B. Testing Agency: Owner will engage a qualified testing agency to perform tests and inspections and prepare test reports.

C. Perform the following tests and inspections of completed installations of acoustical panel

ceiling hangers and anchors and fasteners in successive stages. Do not proceed with installations of acoustical panel ceiling hangers for the next area until test results for previously completed installations show compliance with requirements:

1. Extent of Each Test Area:
    a. When installation of ceiling suspension systems on each floor has reached 20 percent completion but no panels have been installed:
        1) Within each test area, testing agency will select one of every 10 power-actuated fasteners and postinstalled anchors used to attach hangers to concrete and will test them for 200 lbf (890 N) of tension; it will also select one of every two postinstalled anchors used to attach bracing wires to concrete and will test them for 440 lbf (1957 N) of tension.
        2) When testing discovers fasteners and anchors that do not comply with requirements, testing agency will test those anchors not previously tested until 20 pass consecutively and then will resume initial testing frequency.

D. Acoustical panel ceiling hangers and anchors and fasteners will be considered defective if they do not pass tests and inspections.

E. Prepare test and inspection reports.

3.8 CLEANING

A. Clean exposed surfaces of acoustical panel ceilings, including trim, edge moldings, and suspension system members. Comply with manufacturer's written instructions for cleaning and touchup of minor finish damage. Remove and replace ceiling components that cannot be successfully cleaned and repaired to permanently eliminate evidence of damage.

END OF SECTION 09 51 00

SECTION 09 54 23 LINEAR METAL CEILINGS

PART 1 GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Linear metal ceiling system, square edge box type panel, including suspension systems and accessories.

B. System Description: The system consists of prefinished aluminum panels, carriers, and accessories. The system installation is for interior applications.

1.3 SUBMITTALS

A. Product Data: Manufacturer's published literature, including specifications.

B. Manufacturer's Instructions: Detailed installation instructions and maintenance data.

C. Shop Drawings showing:
1. Reflected Ceiling Plan(s): Indicating metal ceiling layout, ceiling mounted items and penetration locations.
2. Suspension System, Carrier and Component Layout.
3. Details of system assembly and connections to building components.

D. Samples:
1. Linear ceiling panels: Minimum 8-inch piece of each type and finish.
2. Color samples: Manufacturers standard colors and finishes for Architect's selection.
3. Suspension system components and moldings/trim.

1.4 QUALITY ASSURANCE

A. Manufacturer/Installer Qualifications:
1. Provide metal ceiling system components produced by a single manufacturer with a minimum 5 years' experience in actual production of specified products and with resources to provide consistent quality in appearance and physical properties, without delaying the work.
2. Provide suspension system components produced by a single manufacturer to provide compatible components for a complete metal ceiling system installation.
3. Perform installations using a firm with installers having no less than 3 years of successful experience on projects of similar size and requirements.

B. Regulatory Requirements:
1. Fire Rating Performance Characteristics: Install system to provide a flame spread of 0 - 25, complying with certified testing to ASTM E84.
2. Structural Criteria: Install and certify system to comply with structural load requirements of governing codes.
3. Installation Standard for Suspension System: Comply with ASTM C636.

C. Mock-Up: Prior to beginning installation erect a mock-up section, where directed, using all

system components.

D. Pre-Installation Conference:
   1. Refer to Section 01 31 00: Project Management and Coordination.

1.5 DELIVERY, STORAGE, AND HANDLING

A. Deliver system components in manufacturer's original unopened packages, clearly labeled.

B. Store components in fully enclosed dry space. Carefully place on skids, to damage from moisture and other construction activities.

C. Handle components to prevent damage to surfaces and edges, and to prevent distortion and other physical damage.

PART 2 PRODUCTS

2.1 MANUFACTURER

A. Specifications are based on products of named manufacturers. Other manufacturers must have a minimum of five (5) years' experience manufacturing products meeting or exceeding the specifications and comply with Division 1 requirements regarding substitutions to be considered.

B. Specifications are based on "**Luxalon"** metal ceiling system manufactured by **Hunter Douglas Architectural Products, Inc.**, (800) 366-4327.

2.2 CEILING PANEL MATERIALS

A. Panel Profile Type: Box 6, roll formed, 0.020-inch-thick aluminum with square edges; 5 5/32-inch wide, 5/8-inch deep with 27/32-inch reveal to form a 6-inch module for interior installations.

B. Panel length: lengths as shown on Drawings

C. Box flat recessed closure: 5/8-inch-wide roll-formed aluminum hat-shaped closure panel to snap-fit between ceiling panels; black finish.

D. Panel Finish: Factory applied polyester painted wood finish to be selected by Architect.

2.3 SUSPENSION SYSTEM MATERIALS

A. Carrier: Universal hat shaped, .038-inch roll-formed aluminum section with hook shaped tabs spaced to receive ceiling panels at 2 inches on center and 27/32 inch apart. Support holes spaced 4 inches on center.

B. Finish: Factory applied black enamel.

C. Hanger Wire: 12-gauge galvanized carbon steel hanger wire.

2.4 CEILING SYSTEM ACCESSORY MATERIALS

A. Panel Splice - Formed aluminum insert designed to snap-fit between ends of two ceiling panels.

1. Finish: Match ceiling panel

B. Access Door: 2 feet by 2 feet aluminum access frame with hinges and retainer clip for downward acting access panel to plenum space where shown or required.

2.5 EXTRA STOCK

A. At completion of work, deliver and store at site as directed not less than one (1) unopened cartons of ceiling materials and one (1) unopened box of suspension system material.

PART 3 EXECUTION

3.1 PROJECT / SITE CONDITIONS

A. Begin system installations only after spaces are enclosed and weathertight, and after all wet work and overhead work have been completed.

B. Prior to starting installations, allow materials to reach ambient room temperature and humidity intended to be maintained for occupancy.

3.2 EXAMINATION

A. Examine areas receiving linear metal ceiling system for conditions that might adversely affect the installation.

B. Verify that all work above ceiling system has been satisfactorily completed prior to start of ceiling installations.

C. Do not start ceiling installations until all unsatisfactory conditions affecting ceiling systems have been corrected.

3.3 PREPARATION

A. Provide layouts for inserts, clips and other support items required to be installed by other trades. Furnish inserts, clips and related items to other trades in a timely manner to preclude construction delays.

B. Coordinate with other trades for proper installation of inserts and related items.

C. Verify ceiling layouts by actual field measurements:
1. Establish ceiling layout to balance borders and minimize out-of-square conditions. Coordinate all work that penetrates ceiling panels.

3.4 INSTALLATION

A. Install linear metal ceiling system in accordance with manufacturer's printed installation instructions, submittals, applicable industry standards, and governing regulatory requirements for the work.

B. Suspension System Installation:
1. Install suspension system to comply with requirements of ASTM C636.
2. Support hangers securely from building structure using wires directly attached to structure, or to inserts or other devices with eye-screws, by looping and wire-tying.

C. Install ceiling panels and trim pieces with neat, tight joints and to comply with approved

details:

1. Scribe and cut panels as necessary to fit at borders and other penetrations and install panel splices to comply with manufacturer's instructions.
2. Install end caps and edge molding trim at perimeter of linear metal ceiling system and at other locations where required to conceal edges of ceiling

3.5 ADJUST AND CLEAN

A. Adjust components to provide uniform tolerances.

B. Replace all ceiling panels that are scratched, dented or otherwise damaged.

C. Clean exposed surfaces with non-solvent, non-abrasive commercial type cleaner.

END OF SECTION 09 54 23

SECTION 09 65 13 RESILIENT BASE

PART 1 GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section includes requirements including but not limited to:
   1. Resilient Wall base.
   2. Accessories necessary for a complete installation.

1.3 SUBMITTALS

A. Product Data: Technical data for each type of product including manufacturer's installation instructions.

B. Samples: Sample of Base Selected or Color Chart if none selected.

C. Maintenance Data: Submit for inclusion in maintenance manuals.

1.4 QUALITY ASSURANCE

A. Installer Qualifications: Entity having minimum 5 years documented experience who employs workers competent in techniques required by manufacturer for floor tile installation and seaming method indicated.

1.5 DELIVERY, STORAGE, AND HANDLING

A. Store base and installation materials in dry spaces protected from the weather, with ambient temperatures maintained within range recommended by manufacturer, but not less than 50 degrees F (10 degrees C) or more than 85 degrees F (29 degrees C). Store floor tiles on flat surfaces.

PART 2 PRODUCTS

2.1 MATERIALS

A. Basis of Design Product:
   1. Manufacturers and tile series, pattern, and color selections are indicated in the Finish Schedule and are a basis of design. Subject to compliance with requirements, provide product indicated in Finish Schedule or comparable product by one of the following:
      a. Johnsonite, a division of Tarkett Group. (Basis of Design)
         1. Tarkett Traditional Thermoplastic Rubber Wall Base
      b. Flexco Floors.
      c. Roppe.

B. Rubber Base - ASTM F1861:
   1. Basis of Design: Tarkett Johnsonite Traditional
   2. Material: Resilient Thermoplastic Rubber Wall Base, Type TP, Group 1.
   3. Style: Coved

4. Minimum Thickness: 0.125 inch (3.2 mm).
5. Color: **63 Burnt Umber**
6. Height: 4 inches, unless otherwise indicated on drawings.
7. Outside Corners: Job formed.
8. Inside Corners: Job formed.

C. Adhesives: Water resistant type recommended by floor tile and adhesive manufacturers to suit floor tile and substrate conditions indicated.

PART 3 EXECUTION

3.1 FIELD CONDITIONS

A. Maintain ambient temperatures within range recommended by manufacturer, but not less than 70 degrees F (21 degrees C) or more than 85 degrees F (29 degrees C), in spaces to receive floor tile during the following time periods:
1. 48 hours before installation.
2. During installation.
3. 48 hours after installation.

B. After installation and until Substantial Completion, maintain ambient temperatures within range recommended by manufacturer, but not less than 55 degrees F (13 degrees C) or more than 95 degrees F (35 degrees C).

C. Close spaces to traffic for 48 hours after installation.

3.2 EXAMINATION

A. Examine substrates for compliance with requirements for maximum moisture content and other conditions affecting performance of the work:
1. Verify that finishes of substrates comply with tolerances and other requirements specified for other work and that substrates are free of cracks, ridges, depressions, scale, and foreign deposits that might interfere with adhesion of floor tile.

B. Proceed with installation after correcting unsatisfactory conditions. Installation of resilient flooring and accessories indicates acceptance of surfaces and conditions.

3.3 PREPARATION

A. Immediately before installation, sweep clean substrates to be covered by resilient base.

3.4 INSTALLATION

A. Comply with manufacturer's written instructions for installing flooring. Scribe and cut flooring to butt neatly and tightly to vertical surfaces, permanent fixtures, and built in furniture including cabinets, pipes, outlets, edgings, thresholds, and nosings. Extend flooring into toe spaces, door reveals, closets, and similar openings.

B. Maintain reference markers, holes, and openings that are in place or marked for future cutting by repeating on flooring as marked on substrates. Use chalk or other nonpermanent marking device.

C. Resilient Base:
1. Comply with manufacturer's written instructions for installing resilient base. Apply

resilient base to walls, columns, pilasters, casework and cabinets in toe spaces, and other permanent fixtures in rooms and areas where base is required:

a. Install resilient base in lengths as long as practical without gaps at seams and with tops of adjacent pieces aligned.
b. Tightly adhere resilient base to substrate throughout length of each piece, with base in continuous contact with horizontal and vertical substrates.
c. Do not stretch resilient base during installation.
d. On masonry surfaces or other similar irregular substrates, fill voids along top edge of resilient base with manufacturer's recommended adhesive filler material.
e. Preformed Corners: Install preformed corners before installing straight pieces.
f. Job Formed Corners:
    1) Outside Corners: Use straight pieces of maximum lengths possible and form with returns not less than 3 inches (76 mm) in length.
    2) Form without producing discoloration (whitening) at bends.
    3) Inside Corners: Use straight pieces of maximum lengths possible and form with returns not less than 3 inches (76 mm) in length:
        a) Miter or cope corners to minimize open joints.

END OF SECTION 09 65 13.13

SECTION 09 65 19.33

RESILIENT RUBBER TILE FLOORING

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.02 SUMMARY

A. Section Includes:
1. Rubber Floor Tile.
2. Rubber Sheet Flooring.
3. Installation Materials.

1.03 SUBMITTALS

A. Product Data: For each type of product indicated.

B. LEED Submittals:
1. Product Data for Credit EQ 4.1: For adhesives, include printed statement of VOC content and chemical components.

C. Samples for Initial Selection: For each type of product indicated.

D. Samples for Verification: For each type of product indicated, in manufacturer's standard-size samples of each resilient product color, texture, and pattern required.

E. Product Schedule: For resilient products. Use same designations indicated on Drawings.

1.04 QUALITY ASSURANCE

A. Installation Qualification: Contractors for floor covering installation should be experienced in managing commercial flooring projects and provide professional installers, qualified to install the various flooring materials specified. An installer is “qualified” if trained by Tarkett or a certified INSTALL (International Standards & Training Alliance) resilient floor covering installer.

B. Mockups: Provide resilient products with mockups specified in other Sections.

1.05 DELIVERY, STORAGE, AND HANDLING

A. Store resilient products and installation materials in dry spaces protected from the weather, with ambient temperatures maintained within range recommended by Tarkett, but not less than 55 deg F (13 deg C) or more than 85 deg F (29 deg C).

1.06 PROJECT CONDITIONS

A. Install resilient products after other finishing operations, including painting, have been completed.

B. Maintain ambient temperatures within range recommended by Tarkett, but not less than 65 deg F (18 deg C) or more than 85 deg F (29 deg C) in spaces to receive resilient products during the following time periods:
   1. 48 hours before installation.
   2. During installation.
   3. 48 hours after installation.

C. Maintain the ambient relative humidity between 40% and 60% during installation.

D. Until Substantial Completion, maintain ambient temperatures within range recommended by Tarkett, but not less than 55 deg F (13 deg C) or more than 85 deg F (29 deg C).

PART 2 - PRODUCTS

1.07 RESILIENT SHEET FLOORING

A. MANUFACTURERS
   1. **Tarkett North America**, 30000 Aurora Road, Solon Ohio 44139 Phone: 800-899-8916 (440) 543-8916 Web: www.tarkettna.com

B. MATERIALS
   1. Basis of Design: Johnsonite Triumph Multi-Functional and Sports Rubber Tile Classification specify: ASTM F1344, [Type I, A - solid color homogeneous through mottled rubber tile] or [Type I, B - through mottled homogeneous rubber tile].
   2. For thickness specify: **0.375 inch (9.5 mm)**
   3. **Square SlideLock Tiles**
   4. Tile size: **24 in. x 24 in. (61cm x 61 cm)**
   5. Colors and Patterns: [As indicated by manufacturer's designations] [Match Architect's sample] [As selected by Architect from full range of industry colors]

      a) Fitness Room – LB9 Rainstorm (See interior elevations for wall locations)
      b) 18”H Base: Tarkett Replay Sheet Roll
         1) For thickness specify: 0.375 inch (9.5 mm)
         2) For roll size: 48 in. wide roll (122 mm)
         3) Color: 507 Night
      c) Elevator Cab – Rainy Day (See interior elevations for wall locations)

C. Test data:
   1. Hardness (ASTM D2240): ≥ 70 Shore A
   2. Abrasion Resistance (ASTM D3389): Passes
   3. Resistance to Chemicals (ASTM F925): Passes
   4. Static Load Resistance (ASTM F970): 250 psi
   5. Resistance to Heat (ASTM F 1514): $\Delta E \leq 8$
   6. Size/Squareness Tolerance (ASTM F2055): Passes
   7. Dimensional Stability (ASTM F2199): Passes
   8. Static Coefficient of Friction (ASTM D 2047): ≥ 0.8 SCOF
   9. Flamability (ASTM E648, Critical Radiant Flux): Class 1 (≥ 0.45 W/cm^2)
   10. Smoke Density (ASTM E662): ≤ 450

1.08 INSTALLATION MATERIALS

A. Trowelable Leveling and Patching Compounds: Latex-modified, Portland cement based or blended hydraulic-cement-based formulation.

B. Adhesives: As recommended by Tarkett to meet site conditions
   1. Tarkett 965 Flooring and Tread Adhesive
   2. Tarkett 975 Two-Part Urethane Adhesive
   3. Tarkett 996 Two-Part Expoxy Adhesive
   4. Tarkett 901 SpraySmart Adhesive

PART 3 - EXECUTION

3.01 EXAMINATION

A. Examine substrates, with Installer present, for compliance with requirements for maximum moisture content and other conditions affecting performance of the work.

B. Verify that finishes of substrates comply with tolerances and other requirements specified in other Sections and that substrates are free of cracks, ridges, depressions, scale, and foreign deposits that might interfere with adhesion of resilient products.

C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.02 PREPARATION

A. Prepare substrates according to Tarkett written instructions to ensure proper adhesion of Resilient Flooring.
   1. Prepare concrete substrates in accordance with ASTM F 710.
      a. Concrete treads must be free of dust, solvent, paint, wax, oil, grease, residual adhesive, adhesive removers, film-forming curing compounds, silicate penetrating curing compounds, sealing, hardening or parting compounds, alkaline salts, excessive carbonation or laitence, mold, mildew, and other foreign materials that may affect dissipation rate of moisture from the concrete, discoloration or adhesive bonding.
      b. Mechanically remove contamination on the substrate that may cause damage to the resilient flooring material. Permanent and non-permanent markers, pens, crayons, paint, etc., must not be used to write on the back of the flooring material or used to mark the substrate as they could bleed through and stain the flooring material.
   2. Wood subfloors must be rigid, free of movement.
      a. Single wood and tongue and groove subfloors should be covered with ¼" (6.4 mm) or ½" (12.7 mm) APA approved underlayment plywood.
      b. Do not install over OSB (Oriented Strand Board), particle board, chipboard, lauan or composite type underlayments.

B. Fill cracks, holes, depressions and irregularities in the substrate with good quality Portland cement based underlayment leveling and patching compound and remove bumps and ridges to produce a uniform and smooth substrate.

C. Do not install resilient products until they are same temperature as the space where they are to be installed.

D. Move resilient products and installation materials into spaces where they will be installed at least 48 hours in advance of installation.

E. Sweep and vacuum clean substrates to be covered by resilient products immediately before installation.

3.03 RESILIENT TILE FLOORING INSTALLATION

A. Comply with manufacturer's written instructions for installing resilient tile flooring.

B. Resilient Rubber Floor Tile:
   1. Install with Tarkett adhesive specified for the site conditions and follow adhesive label for proper use.
   2. Roll the flooring in both directions using a 100 pound three-section roller.

3.04 CLEANING AND PROTECTION

C. Comply with manufacturer's written instructions for cleaning and protection of resilient products.

D. Perform the following operations immediately after completing resilient product installation:
   1. Remove adhesive and other blemishes from exposed surfaces.
   2. Sweep and vacuum surfaces thoroughly.
   3. Damp-mop surfaces to remove marks and soil.

E. Protect resilient products from mars, marks, indentations, and other damage from construction operations and placement of equipment and fixtures during remainder of construction period.
   1. No traffic for 24 hours after installation.
   2. No heavy traffic, rolling loads, or furniture placement for 72 hours after installation.

F. Wait 72 hours after installation before performing initial cleaning.

G. A regular maintenance program must be started after the initial cleaning.

END OF SECTION 09 65 19.33

SECTION 09 68 00 CARPETING

PART 1 GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section Includes: Requirements including but not limited to:
   1. Carpet.
   2. Carpet Pad.
   3. Accessories necessary for a complete installation.

B. Related Sections:
   1. Section 03 30 00: Cast-in-Place Concrete.
   2. Section 09 30 00: Tiling.
   3. Section 09 65 19: Resilient Tile Flooring.
   4. Section 09 68 01: Carpeting Walk-off Mats.

1.3 DEFINITIONS

A. Comparable Product: Product demonstrated and approved through submittal process, or where indicated as a produce substitution, to have the indicated qualities related to type, function, dimension, in-service performance, physical properties, appearance, and other characteristics that equal or exceed those of specified product.

1.4 SUBMITTALS

A. Product Data: Technical data including installation recommendations for each type of substrate:
   1. Carpet: For each type indicated. Include manufacturer's written data on physical characteristics, durability, and fade resistance.

B. Samples: For each product and for each color and texture required. Label each Sample with manufacturer's name, material description, color, pattern, and designation indicated on Drawings and in schedules.
   1. Carpet: 12- inch square Sample from approved color and product of carpet.
   2. Exposed Edge, Transition, and Other Accessory Stripping: 12-inch-long Samples.
   3. Carpet Seam: 6- inch Sample.
   4. Mitered Carpet Border Seam: 12- inch square Sample. Show carpet pattern alignment.
   5. Carpet base and accessory samples.

C. Product Test Reports: For carpet and carpet cushion, for tests performed by a qualified testing agency.

D. Shop Drawings: Showing extent of product, seam direction, and location and type of carpet accessories. Submittal to indicate columns, doorways, enclosing walls or partitions, casework, and locations where cutouts are required.

E. Maintenance Data: For carpet to include in maintenance manuals. Include the following:

1. Methods for maintaining carpet, including cleaning and stain-removal products and procedures and manufacturer's recommended maintenance schedule.
2. Precautions for cleaning materials and methods that could be detrimental to carpet and carpet cushion.

1.5 QUALITY ASSURANCE

A. Regulatory Requirements:
1. Building Code: Comply with applicable requirements for the IBC for interior finishes.
2. Fire Test Response Characteristics: Provide products with the critical radiant flux classification determined by testing identical products in accordance with ASTM E 648. Critical Radiant Flux Classification: Class I, not less than 0.45 W/sq. cm.
3. Accessibility Requirements - Comply with applicable requirements:
   a. Americans with Disabilities Act of 1990, as amended:
      1) ADA Title II Regulations & the 2010 ADA Standards for Accessible Design
      2) 2010 ADA regulations.
   b. CBC 2022 California Building Code (CCR Title 24, Part 2, as adopted and amended by DSA):
      1) CBC Chapter 11B, Access to Public Buildings, Public Accommodations, Commercial Buildings and Public Housing.
4. CRI – Carpet and Rug Institute Green Label Plus.
5. Carpet shall have level loop, textured loop, or level-cut/uncutpile texture, firm cushion, pad or backing (or no cushion or pad) and maximum pile height of 1/2 inch in accordance with CBC Section 11B-302.2. Carpet edges shall comply with CBC 11B-302.2 and carpet trim to CBC Section 11B-303.

B. Installer Qualifications: Installer having minimum 5 years documented experience as a commercial carpet installer, who is certified by the International Certified Floorcovering Installers Association at the Commercial II or higher certification level.

C. Contractor is required to achieve the specified concrete moisture content prior to installation of all flooring materials or use a flooring manufacture approved moisture barrier prior to installation of all flooring products.

D. Pre-installation Conference:
1. Refer to Section 01 31 00: Project Management and Coordination.

1.6 DELIVERY, STORAGE, AND HANDLING

A. Comply with CRI 104.

B. Store in a dry location between 65 degrees F and 90 degrees F and a relative humidity below 65%. Protect from damage and soiling. Stack carpet rolls horizontally, elevated above slab level on a flat surface, stacked no higher than two rolls.

C. Store materials in area of installation for minimum period of 48 hours prior to installation.

D. Protect carpet from damage, dirt, stains, and moisture.

1.7 WARRANTY

A. Carpet: Written warranty in which manufacturer agrees to repair or replace components of carpet installation that fail in materials or workmanship within specified warranty period.

B. Warranty does not include deterioration or failure of carpet due to unusual traffic, failure of substrate, vandalism, or abuse.

C. Failures include, but are not limited to, more than 10 percent loss of face fiber, edge raveling, snags, runs, loss of tuft bind strength, dimensional stability, excessive surface wear, excess static discharge, and delamination.

D. Warranty Period: 25 years from date of Substantial Completion.

PART 2 PRODUCTS

2.1 MATERIALS

A. Specifications are based on products of manufacturers named as the Basis of Design. Manufacturers listed whose product meet or exceed the specifications are approved for use on the Project. Other manufacturers must have a minimum of ten (10) years' experience manufacturing products meeting or exceeding the specifications and comply with Division 01 requirements regarding substitutions to be considered.
   1. Manufacturers are subject to compliance with requirements; provide products by one of the following:
      a. Interface (basis of design), or acceptable alternative manufacturers, subject to compliance with design requirements.

B. General Carpet Requirements
   1. Performance:
      b. Appearance Retention Rating: Severe traffic, 3.5 minimum according to ASTM D 7330.
      c. Critical Radiant Flux Classification: Not less than 0.45 W/sq. cm according to NFPA 253.
      d. Dry Breaking Strength: Not less than 100 lbf (445 N) according to ASTM D 2646.
      e. Delamination: Not less than 4 lbf/in. (18 N/mm) per ASTM D 3936.
      f. Tuft Bind: Not less than 5 lbf (22 N) according to ASTM D 1335.
      g. Colorfastness to Crocking: Not less than 4, wet and dry, according to AATCC 165.
      h. Resistance to Insects: Comply with AATCC 24.
      i. Colorfastness to Crocking: Not less than 4, wet and dry, per AATCC 165.
      j. Colorfastness to Light: Not less than 4 after 40 AFU (AATCC fading units) according to AATCC 16, Option E.
      k. Antimicrobial Activity: Not less than 2 mm halo of inhibition for gram-positive bacteria; not less than 1 mm halo of inhibition for gram-negative bacteria; no fungal growth; per AATCC 174.
      l. Electrostatic Propensity: Less than 3.5 kV according to AATCC 134.
      m. Backing: Standard with manufacturer.
   2. Face Construction:
      a. Gauge: 1/13 minimum.
      b. Pile Units per Inch: 7.5 minimum.
      c. Pile Height Average: 0.16 inch minimum.
      d. Tuft Density: 104.96.
      e. Fiber Content: Type 6 **OR** Type 6,6 Branded Manufacturer.
      f. Dye Method: 50% Solution Dyed/50% Yarn Dyed minimum.
   3. Backing Material
      a. Basis of Design: Glass Back.
      b. Primary Tufting Substrate: Synthetic nonwoven.
      c. Soil/Stain Protection: As recommended by Manufacturer.
      d. Preservation Protection: As recommended by Manufacturer.

e. Backing: Closed-Cell Vinyl Cushion
   1) Weight: 35.5 ounces per square yard
   2) Density: 18.5 lbs. per cubic foot
   3) Thickness: 5/32 inch.
   4) Compression Set: Maximum 10 percent
f. Adhesive System: Adhesive as recommended by manufacturer
g. Total Product Weight: RS 83.0 ounces per square yard plus or minus 5 percent.
   Product Testing Information:
a. Surface Flammability: Passes CPSC FF-1-70. (ASTM D2859).
b. Flooring Radiant Panel: Class 1 (mean average CRF: 0.45 watts per square centimeter or higher. (ASTM E648).
c. Electrostatic Propensity: 3.0 kV or lower. Permanent Conductive Fiber. (AATCC 134).

4. Applied Soil Resistance Treatment: Standard with manufacturer.
5. Antimicrobial Treatment: Standard with manufacturer.
6. Adhesives: Water resistant, mildew resistant, non-staining, pressure sensitive type to suit products and subfloor conditions indicated, complying with flammability requirements for installed carpet and is recommended by carpet manufacturer for releasable installation.
7. Extra Carpet: After completion of the carpet installation, the carpet subcontractor shall provide an additional three (3) percent of total yards installed of each carpet specified to the Owner for future carpet replacement that may be required. This extra stock is to be unused rolls, tiles, and mats and does not include scraps.

C. Carpet Schedule
1. CPT-1: Tile Carpet
   a. Manufacturer: Interface
   b. Style: Ice breaker
   c. Color: Refer to drawings.
   d. Size: 20”x20”.
   e. Location(s): As indicated on Drawings.
   f. Installation: Non-directional

PART 3 ACCESSORIES

A. Trowelable Leveling and Patching Compounds: Latex modified, hydraulic cement-based formulation provided or recommended by carpet cushion manufacturer.

B. Adhesives: Water resistant, mildew resistant, non-staining type to suit products and subfloor conditions indicated, that complies with flammability requirements for installed carpet and is recommended or provided by carpet and carpet cushion manufacturers. Refer to SJVAPCD VOC limits.

C. Seam Adhesive: Hot melt adhesive tape or similar product recommended by carpet manufacturer for sealing and taping seams and butting cut edges at backing to form secure seams and to prevent pile loss at seams.

PART 4 EXECUTION

4.1 EXAMINATION

A. Examine substrates, areas, and conditions for compliance with requirements for maximum moisture content, alkalinity range, installation tolerances, and other conditions affecting

carpet performance. Examine carpet for type, color, pattern, and potential defects.

B. Concrete Subfloors: Verify that concrete slabs comply with ASTM F 710 and the following:
   1. Slab substrates are dry and free of curing compounds, sealers, hardeners, and other materials that may interfere with adhesive bond. Determine adhesion and dryness characteristics by performing bond and moisture tests recommended by carpet and cushion manufacturer.
   2. Subfloor finishes comply with requirements specified in Section 03 30 00: Cast-in-Place Concrete, for slabs receiving carpet.
   3. Subfloors are free of cracks, ridges, depressions, scale, and foreign deposits.

4.2 FIELD CONDITIONS

A. Comply with CRI 104 for temperature, humidity, and ventilation limitations.

B. Environmental Limitations: Do not deliver or install carpet and carpet cushion until spaces are enclosed and weathertight, wet work in spaces is complete and dry, and ambient temperature and humidity conditions are maintained at occupancy levels during the remainder of the construction period.

C. Do not install carpet and carpet cushion over concrete slabs until slabs have cured, are sufficiently dry to bond with adhesive, and have pH range recommended by carpet manufacturer.

D. Where demountable partitions or other items are indicated for installation on top of carpet, install carpet before installing these items.

E. Proceed with installation after correcting unsatisfactory conditions.

4.3 PREPARATION

A. Comply with CRI 104, Section 7.3 *Site Conditions; Floor Preparation* and with carpet manufacturer's written installation instructions for preparing substrates.

B. Use trowelable leveling and patching compounds, according to manufacturer's written instructions, to fill cracks, holes, depressions, and protrusions in substrates. Fill or level cracks, holes and depressions 1/8 inch (3 mm) wide or wider, and protrusions more than 1/32 inch (0.8 mm), unless more stringent requirements are required by manufacturer's written instructions.

C. Remove coatings, including curing compounds, and other substances that are incompatible with adhesives and that contain soap, wax, oil, or silicone, without using solvents. Use mechanical methods recommended in writing by carpet and cushion manufacturer.

D. Broom and vacuum clean substrates to be covered immediately before installing carpet.

4.4 INSTALLATION

A. Refer to Drawings and Finish Schedule for installation patterns.

B. Comply with CRI 104 and carpet and carpet cushion manufacturer written installation instructions for the following:
   Direct Glue Down Installation
   Stair Installation

C. Comply with carpet manufacturer's written recommendations and Shop Drawings for seam locations and direction of carpet; maintain uniformity of carpet direction and lay of pile. At doorways, center seams under the door in closed position.
   1. Do not bridge building expansion joints with carpet.
   2. Cut and fit carpet to butt tightly to vertical surfaces, permanent fixtures, and built-in furniture including cabinets, pipes, outlets, edgings, thresholds, and nosings. Bind or seal cut edges as recommended by carpet manufacturer.
   3. Extend carpet into toe spaces, door reveals, closets, open-bottomed obstructions, removable flanges, alcoves, and similar openings.

D. Maintain reference markers, holes, and openings that are in place or marked for future cutting by repeating on finish flooring as marked on subfloor. Use nonpermanent, non-staining marking device.

E. Install to comply with CRI 104.

4.5 CLEANING AND PROTECTING

A. Perform cleaning operations immediately after installing carpet:
   1. Remove excess adhesive, seam sealer, and other surface blemishes using cleaner recommended by carpet manufacturer.
   2. Remove yarns that protrude from carpet surface.
   3. Vacuum carpet using commercial machine with face beater element.

B. Protect installed carpet to comply with CRI 104.

C. Protect carpet against damage from construction operations and placement of furniture, fixtures, and equipment during the remainder of construction period. Use protection methods indicated or recommended in writing by carpet manufacturer and carpet cushion manufacturer.

END OF SECTION 09 68 00

SECTION 09 68 01 CARPETING WALK-OFF-MATS

PART 1 GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section includes requirements including but not limited to:
   1. Walk Off Carpet.
   2. Accessories necessary for a complete installation.

B. Related Sections;
   1. Section 03 30 00: Cast-in-Place Concrete.
   2. Section 09 68 00: Carpeting.

1.3 SUBMITTALS

A. Product Data:
   1. Technical data including installation recommendations for each type of substrate:
      a. Carpet:
         1) For each type indicated. Include manufacturer's written data on physical characteristics, durability, and fade resistance.

B. Samples:
   1. For each products and for each color and texture required. Label each Sample with manufacturer's name, material description, color, pattern, and designation indicated on Drawings and in schedules:
      a. Carpet: 12 inch (300 mm) square Sample from approved color and product of carpet.
      b. Exposed Edge, Transition, and Other Accessory Stripping: 12 inch (300 mm) long Samples.
      c. Mitered Carpet Border Seam: 12 inch (300 mm) square Sample. Show carpet pattern alignment.
      d. Carpet base and accessory samples.

C. Product Test Reports: For carpet and carpet cushion, for tests performed by a qualified testing agency.

D. Shop Drawings: Showing extent of product, seam direction, and location and type of carpet accessories. Submittal to indicate columns, doorways, enclosing walls or partitions, casework, and locations where cutouts are required.

E. Maintenance Data:
   1. For carpet to include in maintenance manuals. Include the following:
      a. Methods for maintaining carpet, including cleaning and stain-removal products and procedures and manufacturer's recommended maintenance schedule.
      b. Precautions for cleaning materials and methods that could be detrimental to carpet and carpet cushion.

1.4 QUALITY ASSURANCE

A. Regulatory Requirements:
   1. Fire Test Response Characteristics:
      a. Provide products with the critical radiant flux classification determined by testing identical products in accordance with ASTM E648:
         1) Critical Radiant Flux Classification: Class I, not less than 0.45 W/sq. cm.
   2. Accessibility Requirements:
      a. Comply with applicable requirements:
         1) Americans with Disabilities Act of 1990, as amended:
            a) ADA Title II Regulations & the 2010 ADA Standards for Accessible Design.
            b) 2010 ADA regulations.
         2) 2022 California Building Code (CBC) (CCR Title 24, Part 2, as adopted and amended by DSA):
            a) CBC Chapter 11B, Access to Public Buildings, Public Accommodations, Commercial Buildings and Public Housing.
   3. AQMD - Air Quality Management District, Local Regulations.
   4. CRI – Carpet and Rug Institute Green Label Plus.
   5. Carpet shall have level loop, textured loop, or level-cut/uncutpile texture, firm cushion, pad or backing (or no cushion or pad) and maximum pile height of 1/2 inch in accordance with CBC Section 11B-302.2. Carpet edges shall comply with CBC 11B-302.2 and carpet trim to CBC Section 11B-303.

B. Installer Qualifications: Installer having minimum 5 years documented experience as a commercial carpet installer, who is certified by the International Certified Floorcovering Installers Association at the Commercial II or higher certification level.
   1. All products listed in this section shall be installed by a single installer with demonstrated experience in installing products of the same type and scope as specified. Installer shall be insured and licensed as required by agencies within the project's jurisdiction and acceptable to the manufacturer.

C. Contractor is required to achieve the specified concrete moisture content prior to installation of all flooring materials or use a flooring manufacture approved moisture barrier prior to installation of all flooring products.

D. Pre-installation Conference:
   1. Pre-Installation conference to be conducted at project site.

1.5 WARRANTY

A. Written warranty in which manufacturer agrees to repair or replace components of carpet installation that fail in materials or workmanship within specified warranty period:
   1. Warranty does not include deterioration or failure of carpet due to unusual traffic, failure of substrate, vandalism, or abuse.
   2. Failures include, but are not limited to, more than 10 percent loss of face fiber, edge raveling, snags, runs, loss of tuft bind strength, dimensional stability, excessive surface wear, excess static discharge, and delamination.
   3. Warranty Period: 25 years from date of Substantial Completion.

1.6 DELIVERY, STORAGE, AND HANDLING

A. Comply with CRI 104.

B. Store in a dry location between 65 degrees F and 90 degrees F and a relative humidity below 65%. Protect from damage and soiling. Stack carpet rolls horizontally, elevated above slab level on a flat surface, stacked no higher than two rolls.

C. Store materials in area of installation for minimum period of 48 hours prior to installation.

D. Protect carpet from damage, dirt, stains, and moisture.

PART 2 PRODUCTS

2.1 MATERIALS

A. Manufacturers
1. Basis of design: Balco, Inc., PO Box 17249, 2626 S. Sheridan, Wichita, KS 67217; phone: 800-767-0082 or (316) 945-0789.
2. Architect approved equivalent.

2.2 ENTRANCE FLOOR MATS AND GRIDS

A. Entrance Floor Mats: Balco, Inc. FM series entrance floor mats
1. Entrance floor mats shall consist of a series of aluminum tread rails spaced 2” (51mm) on center and running counter to traffic flow.
2. Entrance floor mats shall be provided with Abrasive inserts.
3. Entrance floor mats shall be provided with Recessed, cast-in-place aluminum frames.
4. Entrance floor mats shall be provided with Flexible PVC hinges.
5. Load capacity: Pedestrian
6. Rolling load test performance: Entrance floor mats shall withstand 1000 passes at 400 lbs. (181.4 kg), applied by a 2” wide x 5” diameter polyurethane wheel.
7. Slip resistance: Entrance floor mats shall have a static coefficient of friction of not less than .50 dry, .60 wet, per ASTM D2047-11.
8. Entrance floor mats shall allow debris to fall to sub-floor.

2.3 MATERIALS

A. Aluminum extrusions: ASTM B221, alloy 6063-T5, alloy 6005-T5, alloy 6061-T6

B. Leading edge fillers and hinges: Flexible PVC.

C. Liners:
1. Galvanized steel: ASTM A653, G90, 20 gauge
2. Aluminum: ASTM B209, alloy 5052-H32, 0.063” thick
3. Stainless Steel: ASTM A666, type 304, 22 gauge

D. Abrasive: Two (2) part Epoxy combined with aluminum oxide grit

E. Standard fasteners required for assembly and installation shall be included

F. All surfaces in contact with masonry or concrete shall be protected by a factory-applied coating.

2.4 FINISHES

A. Aluminum Extrusions: Mill finish, AA-M10 (As fabricated, unspecified) standard. Optional finishes: Color anodized – To be selected by Architect’s from manufacturer’s standard colors.

B. Carpet: To be selected by Architect’s from manufacturer’s standard colors.

C. Abrasive: To be selected by Architect’s from manufacturer’s standard colors.

D. PVC Hinges: To be selected by Architect's from manufacturer's standard colors.

2.5 FABRICATION

A. Fabricate entrance floor mats and frames as detailed.
   1. Fabricate entrance floor mats and frames of width and length as shown on shop drawings.
   2. Fabricate entrance floor mats and frame pans of width, length, and depth as shown on shop drawings.
   3. Standard fasteners required for assembly and installation shall be included.

B. Provide components in single size where possible; minimize site splicing.
   1. Maximum single mat width shall be 12' (3.6m) wide for mats with carpet or heavy-duty carpet inserts, 10' (3.0m) for mats with abrasive inserts. Larger sizes shall be fabricated in modular sections.
   2. Provide minimal number of pieces possible for frames that exceed maximum length.
   3. Provide frames with hairline joints, equally spaced, complete with corner pins, splice plates, and installation anchors.

PART 3 EXECUTION

3.1 FIELD CONDITIONS

A. Comply with CRI 104 for temperature, humidity, and ventilation limitations.

B. Environmental Limitations: Do not deliver or install carpet and carpet cushion until spaces are enclosed and weathertight, wet work in spaces is complete and dry, and ambient temperature and humidity conditions are maintained at occupancy levels during the remainder of the construction period.

C. Do not install carpet and carpet cushion over concrete slabs until slabs have cured, are sufficiently dry to bond with adhesive, and have pH range recommended by carpet manufacturer.

D. Where demountable partitions or other items are indicated for installation on top of carpet, install carpet before installing these items.

3.2 EXAMINATION

A. Examine substrates, areas, and conditions for compliance with requirements for maximum moisture content, alkalinity range, installation tolerances, and other conditions affecting carpet performance. Examine carpet for type, color, pattern, and potential defects.

B. Concrete Subfloors:
   1. Verify that concrete slabs comply with ASTM F710 and the following:
      a. Slab substrates are dry and free of curing compounds, sealers, hardeners, and other materials that may interfere with adhesive bond.
      b. Prior to delivery of flooring materials, contractor shall conduct Calcium Chloride "dome" test to verify that concrete floors are dry with maximum moisture vapor emissions of 3 lbs. per 1000 square feet. in 24 hours, and exhibit negative alkalinity, carbonation or dusting. Apply moisture test in four (4) different areas of each floor location with at least one test for each 1,000 square feet of floor area.
      c. Prior to delivery of carpeting, conduct Relative Humidity Test Method in

accordance with ASTM F2170 using a Wagner Rapid RH probe to verify relative humidity and surface pH of concrete floor slabs, the method:

1) Requires drilling holes at diameter not to exceed outside diameter of probe by more than 0.04 inch to depth equal to 40 percent of slab's thickness (elevated structural slab shall be tested at depth equal to 20 percent of slab thickness).
2) Place probe to full depth of test hole, place cap over probe.
3) Permit test site to acclimate, or equilibrate, for 72 hours prior to taking relative humidity readings.
4) Remove cap and press button on the probe to obtain reading.
5) Relative humidity readings for substrates receiving non-permeable flooring are 75% or lower.

d. Testing shall require 3 tests in first 1,000 square feet, with one additional test per each additional 1,000 square feet of concrete slab surface.
e. Alkalinity Testing: Concrete floors shall be tested for alkalinity prior to installation of flooring. Levels of pH shall not exceed written recommendations of flooring manufacturer or adhesive manufacturer, or both.
f. Delivery of flooring materials and beginning of installation means acceptance of existing substrate and site conditions.
g. Subfloors are free of cracks, ridges, depressions, scale, and foreign deposits.
h. Install Vapor Emission Treatment Systems where tests reveal presence of more than acceptable moisture level in accordance with Test Method ASTM F1869 or ASTM F2170.

C. Proceed with installation after correcting unsatisfactory conditions.

3.3 PREPARATION

A. Comply with CRI 104, Section 7.3 *Site Conditions; Floor Preparation* and with carpet manufacturer's written installation instructions for preparing substrates.

B. Use trowelable leveling and patching compounds, according to manufacturer's written instructions, to fill cracks, holes, depressions, and protrusions in substrates. Fill or level cracks, holes and depressions 1/8 inch (3 mm) wide or wider, and protrusions more than 1/32 inch (0.8 mm), unless more stringent requirements are required by manufacturer's written instructions.

C. Remove coatings, including curing compounds, and other substances that are incompatible with adhesives and that contain soap, wax, oil, or silicone, without using solvents. Use mechanical methods recommended in writing by carpet and cushion manufacturer.

D. Broom and vacuum clean substrates to be covered immediately before installing carpet.

3.4 INSTALLATION

A. Comply with CRI 104 and carpet and carpet cushion manufacturer written installation instructions for the following:
   1. Direct Glue Down Installation: Comply with CRI 104, Section 9 *Direct Glue Down Installation*.
   2. Stair Installation: Comply with CRI 104, Section 13 *Carpet on Stairs* for glue down installation.

B. Comply with carpet manufacturer's written recommendations and Shop Drawings for seam locations and direction of carpet; maintain uniformity of carpet direction and lay of pile. At doorways, center seams under the door in closed position:

1. Do not bridge building expansion joints with carpet.
2. Cut and fit carpet to butt tightly to vertical surfaces, permanent fixtures, and built-in furniture including cabinets, pipes, outlets, edgings, thresholds, and nosings. Bind or seal cut edges as recommended by carpet manufacturer.
3. Extend carpet into toe spaces, door reveals, closets, open-bottomed obstructions, removable flanges, alcoves, and similar openings.

C. Maintain reference markers, holes, and openings that are in place or marked for future cutting by repeating on finish flooring as marked on subfloor. Use nonpermanent, nonstaining marking device.

D. Install pattern parallel to walls and borders to comply with CRI 104, Section 15, *Patterned Carpet Installations* and with carpet manufacturer's written recommendations.

E. Install in accordance with CBC Section 11B-302.2

3.5 CLEANING AND PROTECTING

A. Perform cleaning operations immediately after installing carpet:
1. Remove excess adhesive, seam sealer, and other surface blemishes using cleaner recommended by carpet manufacturer.
2. Remove yarns that protrude from carpet surface.
3. Vacuum carpet using commercial machine with face beater element.

B. Protect installed carpet to comply with CRI 104, Section 16, *Protecting Indoor Installations*.

C. Protect carpet against damage from construction operations and placement of equipment and fixtures during the remainder of construction period. Use protection methods indicated or recommended in writing by carpet manufacturer and carpet cushion manufacturer.

END OF SECTION 09 68 01

SECTION 09 90 00 PAINTING AND COATING

PART 1 GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section includes requirements including but not limited to:
   1. Surface preparation and field painting of exposed items and surfaces.
   2. Field preparation and painting of factory primed metal products and fabrications.
   3. Accessories necessary for a complete installation.

B. Related Sections (Including but not limited to):
   1. Section 05 50 00: Metal Fabrications.
   2. Section 06 10 00: Rough Carpentry.
   3. Section 08 11 13: Hollow Metal Doors and Frames.
   4. Section 09 21 16: Gypsum Board Assemblies.

1.3 DEFINITIONS

A. Standard coating terms defined in ASTM D16 apply:
   1. Flat refers to a lusterless or matte finish with a gloss range below 15 when measured at an 85-degree meter.
   2. Eggshell refers to low sheen finish with a gloss range between 20 and 35 when measured at a 60-degree meter.
   3. Satin refers to a slightly higher sheen than eggshell and more reflective and durable finish and is less lustrous than semi-gloss.
   4. Semigloss refers to medium sheen finish with a gloss range between 35 and 70 when measured at a 60-degree meter.
   5. Full gloss refers to high sheen finish with a gloss range more than 70 when measured at a 60-degree meter

1.4 SUBMITTALS

A. Product Data:
   1. Submit technical data and information for block fillers, primers, paints, and coatings, including label analysis and instructions for handling, storing, and applying each coating material proposed for use:
      a. Indicate manufacturer's instructions for special surface preparation procedures, substrate conditions requiring special attention.
      b. Material List: Provide inclusive list of required coating materials. Indicate each material and cross reference specific coating, finish system, and application. Identify each material by manufacturer's catalog number, series, and general classification.

B. Samples:
   1. Submit for each type of paint system and in each color and gloss of topcoat:
      a. Provide stepped samples, defining each separate coat, including block fillers and primers. Use representative colors when preparing samples for review. Resubmit until required sheen, color, and texture are achieved.

b. Provide list of material and application for each coat of each sample. Label each sample as to location and application.
c. Submit samples on following substrates for review of color and texture only:
   1) Concrete: Provide two 4-inch square samples for each color and finish.
   2) Concrete Masonry: Provide two 4" x 8" samples of masonry, with mortar joint in the center, for each finish and color.
   3) Painted Wood: Provide two 12-inch square samples of each color and material on hardboard.
   4) Ferrous and Nonferrous Metals: Provide two 4-inch square samples of flat metal and two 8-inch-long samples of solid metal for each color and finish.

C. Product List: Submit product list of each paint system, color, and location of application. Use same product and location designations indicated in Finish Schedule.

D. Coating **Maintenance Manual**: Upon conclusion of the project, the Contractor or paint manufacturer/supplier shall furnish a coating maintenance manual, such as **Sherwin-Williams "Custodian Project Color and Product Information"** report or equal. Manual shall include an Area Summary with Finish Schedule, Area Detail designating where each product/color/finish was used, including product data pages, Manual Safety Data sheets, care and cleaning instructions, touchup procedures, and color samples of each color and finish used.

1.5 QUALITY ASSURANCE

A. Regulatory Requirements:
   1. Comply with Federal and local toxicity and air quality regulations and with Federal requirements on content of for heavy metals, including but not limited to, lead and mercury. Do not use solvents in paint products that contribute to air pollution.
   2. Comply with CARB suggested control measures using the Method 24 analysis.
   3. Performance and Durability:
      a. ASTM D16 – "Standard Test Method for Load Testing Refractory Shapes at High Temperatures."
      b. ASTM D2486 – "Standard Test Method for Scrub Resistance of Interior Wall Paint."
      c. ASTM D2805 – "Standard Test Method for Hiding Power of Paints by Reflectometry."
      d. ASTM D4828 – "Standard Test Method for Practical Washability of Organic Coatings."
      e. ASTM D3363 – "Standard Test Method for Film Hardness by Pencil Test."

B. Applicator Qualifications: A firm or individual having minimum 5 years documented experience in applying paints and coatings similar in material, design, and extent to those indicated.

C. Source Limitations: Obtain block fillers and primers for each coating system from the same manufacturer as the finish coats.

1.6 WARRANTY

A. Written warranty signed by the manufacturer and the installer in which the manufacturer and installer agree to repair or replace paint and primers that fail within specified warranty period:
   1. Failures include, but are not limited to, the following:
      a. Flaking or delamination of paint with the substrate.
      b. Rust, scale, similar imperfections due to improper surface preparation.
      c. Thinning or watering of paint beyond that considered acceptable of paint manufacturer.

d. Failure to achieve dry film thickness (DFT) recommended by manufacturer for each coat in a paint system.
e. Deterioration or loss of color of paint beyond normal weathering.

2. Warranty Period: One year from date of Substantial Completion.

1.7 DELIVERY, STORAGE, AND HANDLING

A. Store materials not in use in tightly covered containers in well ventilated areas with ambient temperatures continuously maintained at not less than 45 degrees F (7 degrees C):
1. Maintain containers in clean condition, free of foreign materials and residue.
2. Remove rags and waste from storage areas daily.

PART 2 PRODUCTS

2.1 MATERIALS

A. Basis of Specifications: **Sherwin Williams Company**: For product inquiries contact: Richard.condie@sherwin.com 916.267.3232
1. Subject to compliance with requirements, provide first quality, 100% acrylic, commercial or industrial products of one of the specified manufacturers. Residential products are not permitted:

   Substituted products must be equal to or better in quality than the Sherwin Williams products listed in Part 4.

   a. Proprietary Names:
      1) Paint Schedule is based on a single manufacturer for convenience with exception to the paint used in specific areas where specialized coatings are required (Refer to Drawings).
      2) Use of manufacturer's proprietary product names to designate colors or materials is not intended to imply that named products are required to the exclusion of comparable products of specified manufacturers.
      3) Furnish product technical data, including per cent solids by weight and volume: (Method 24 analysis)
         a) VOC content limits and emissions data.
         b) Certificates of performance for comparable paint products of specified manufacturer.
      4) Use MPI index to coordinate performance based
   b. Paint Products:
      5) Sherwin-Williams Co.
      6) PPG Industries, Inc.
      7) Dulux; Theater Black (Where applicable, see Drawings)

B. Material Compatibility: Provide each paint system including block fillers, primers, and finish coats, that are compatible with one another and with substrates indicated under conditions of service and application, demonstrated by manufacturer based on testing and field experience.

C. Material Quality: Provide manufacturer's best quality commercial paint material of the various coating types specified that are factory formulated and recommended by manufacturer for application indicated. Paint material containers not displaying manufacturer's product identification will not be acceptable. Residential quality paint products are not permitted.

D. Chemical Components of Interior Paints and Coatings:

1. Provide products complying with limits for VOC content when calculated according to 40 CFR 59, Subpart D (EPA Method 24):
   a. Aromatic Compounds: Paints and coatings shall not contain more than 1.0 percent by weight of total aromatic compounds (hydrocarbon compounds containing one or more benzene rings).
   b. Restricted Components: Paints and coatings shall not contain components restricted by the EPA.

E. Accessories: Materials not specifically indicated but required to achieve the finishes specified, of commercial quality.

F. Patching Materials: Latex filler compatible with paint systems.

G. Fastener Head Cover Materials: Latex filler.

H. Theater Black: No Exceptions or alternates.

2.2 SOURCE QUALITY CONTROL

A. Testing of Paint Materials:
   1. Owner reserves the right to invoke to engage the services of a qualified testing agency to sample paint materials:
      a. Contractor will be notified in advance and may be present when samples are taken. If paint materials have already been delivered to site, samples may be taken at the site. Samples will be identified, sealed, and certified by testing agency.
      b. Testing agency will perform tests for compliance with product requirements.
      c. Owner may direct Contractor to stop applying paints if test results show materials being used do not comply with product requirements. Contractor shall remove noncomplying paint materials from Project site, pay for testing, and repaint surfaces painted with rejected materials. Contractor will be required to remove rejected materials from previously painted surfaces if, on repainting with complying materials, the two paints are incompatible.

PART 3 EXECUTION

3.1 FIELD CONDITIONS

A. Apply waterborne paints when temperatures of surfaces to be painted and surrounding air are between 50 degrees F and 90 degrees F (10 degrees and 32 degrees C).

B. Do not thin or add water to waterbased paints, including waterbased alkyds.

C. Weather Conditions:
   1. Do not apply materials when surface and ambient temperatures are outside the temperature ranges required by the paint product manufacturer.
   2. Do not apply paint in snow, rain, fog, or mist; or when the relative humidity exceeds 85 percent; or at temperatures less than 5 degrees F (3 degrees C) above dew point; or to damp or wet surfaces.
   3. Minimum Application Temperatures for Water based Paints: Between 50 degrees F (10 degrees C) and 90 degrees F (32 degrees C).

D. Apply solvent thinned paints when temperatures of surfaces to be painted and surrounding air are between 45 degrees F and 95 degrees F (7 degrees F and 35 degrees C):
   1. Minimum Application Temperature for Varnish Finishes: 65 degrees F (18 degrees C) for interior or exterior, unless required otherwise by manufacturer's instructions.

2. Painting may continue during inclement weather if surfaces and areas to be painted are enclosed and heated within temperature limits specified by the manufacturer during application and drying periods.

E. Provide lighting level of 80-foot candles (860lx) measured midheight at substrate surface.

F. Labels: Do not paint over Underwriters Laboratories, Factory Mutual, other code required labels, or equipment name, identification, performance rating, or nomenclature plates.

3.2 EXTRA MATERIALS

A. Furnish extra materials, from the same product run, that match products installed and that are packaged with protective covering for storage and identified with labels describing contents:
   1. Paint: 2 percent, but not less than 1 gallon (3.8 L) of each material and color applied.

3.3 EXAMINATION

A. Examine substrates and conditions for compliance with requirements for maximum moisture content and conditions affecting performance of the work.

B. Test substrates after repairing and cleaning substrates but prior to application of paint and coatings:
   1. Maximum moisture content of substrates, when measured with an electronic moisture meter as follows:
      a. Concrete: 12 percent.
      b. Fiber Cement Board: 12 percent.
      c. Masonry (Clay and CMUs): 12 percent.
      d. Wood: 15 percent.
      e. Gypsum Board: 12 percent.
      f. Plaster: 12 percent.
   2. Test cementitious and plaster cement/stucco for alkalinity (pH).

C. Gypsum Board Substrates: Verify joints are taped and finishing compound is sanded smooth.

D. Plaster Substrates: Verify plaster has fully cured. Verify existing plaster is in good condition and can receive new paint coating.

E. Spray Textured Ceiling Substrates: Verify surfaces are dry.

F. Verify suitability of substrates, including surface conditions and compatibility, with existing finishes and primers:
   1. Verify previously painted surfaces can be stripped to bare substrate, repaired if necessary, and prepared to receive new paint system consisting of primer and two top coats at a minimum:
      a. Note: If previously painted surfaces have failed to accept new paint systems, determine cause of failure and take corrective measures to ensure each surface accepts new paint system. Failure of new paint system is not permitted.

G. Commence paint and coating application after correcting unsatisfactory conditions and surfaces are dry. Application of coating indicates applicator’s acceptance of surfaces and conditions.

3.4 ITEMS TO RECEIVE PAINT

A. Generally, all new items that are normally painted in any typical building, including but not limited to the following list:
   1. All ferrous metal
   2. All exterior galvanized metal
   3. All exterior wood
   4. All interior wood
   5. All prime coated hardware
   6. All exposed pipe, plumbing, ductwork, conduit, outlet boxes and electrical cabinets, excluding those located in mechanical rooms.
   7. All metal grilles, except aluminum, unless otherwise indicated.
   8. All exposed gypsum board surfaces, including all mechanical rooms.
   9. Miscellaneous other items which normally require painting or are scheduled to be painted.
   10. Consult plans, finish schedule, details, and specifications for other trades, as all items usually field painted or finished will be considered as part of the Contract.
   11. All exposed mechanical equipment and electrical equipment.
   12. Traffic lanes and parking spaces including fire lanes and crosswalks.
   13. Rolling doors.
   14. Bollards.
   15. Loose lintels.
   16. Refer to MEP specifications for additional items to receive paint.

B. All work where a coat of material has been applied must be inspected and approved by Architect before application of succeeding specified coat, otherwise no credit for coat applied will be given. Notify Architect when a particular coat has been completed for inspection and approval. Apply coats of material in strict accordance with manufacturer's specifications except where requirements of these specifications are in excess of manufacturer's requirements. Paint all sight exposed pipe and plumbing only after all mechanical work and tests have been completed.

3.5 PREPARATION

A. Coordination of Work:
   1. Review work in which primers are provided to ensure compatibility of the total system for various substrates. Notify Architect of anticipated problems when using materials specified over substrates primed by others:
      a. Preprimed Substrates: Inspect existing conditions in which primers are factory applied to ensure compatibility of the total system for each substrate. Notify Architect of anticipated problems when using the materials specified over factory primed or preprimed substrates.
      b. Existing Painted Surfaces: Inspect previously painted surfaces to ensure compatibility of the existing paints with new paint system for each substrate. Notify Architect of anticipated problems.
      c. Correct defects and clean surfaces affecting bond with paint system. Remove existing paints exhibiting loose surface defects showing signs of rust, scale, or delamination.
      d. Seal marks which may bleed through surface finishes.

B. Surface Preparation:
   1. Clean and prepare surfaces to be painted according to manufacturer's written instructions for each particular substrate condition and as specified. Provide barrier coats over incompatible primers or remove and reprime. If removal is impractical or impossible because of size or weight of item, provide surface applied protection before surface preparation and painting:
      a. Remove hardware and hardware accessories, plates, lighting fixtures, and similar items that are not to be painted. If removal is impractical or impossible because of

size or weight of item, provide surface applied protection before surface preparation and painting. After completing painting operations in each space or area, reinstall items removed using workers skilled in the trades involved.

b. After completing painting operations, use workers skilled in the trades involved to reinstall items that were removed. Remove surface applied protection if any.
c. Do not paint over labels of independent testing agencies or equipment name, identification, performance rating, or nomenclature plates.
d. Clean and prepare surfaces to receive paint according to manufacturer's written instructions for each substrate condition and as specified. Provide barrier coats over incompatible primers, existing paint or coating, or remove and reprime.
e. Correct defects and clean surfaces affecting bond with paint or coating system. Remove existing coatings exhibiting loose surface defects. Seal marks which may bleed through surface finishes.

C. Cleaning:
1. Before applying paint or surface treatments, clean substrates of substances that could impair bond of the various coatings. Remove oil and grease before cleaning. Schedule cleaning and painting so dust and contaminants from the cleaning process will not fall on wet, newly painted surfaces:
   a. Remove incompatible primers, including factory applied primers, and reprime substrate with compatible primers or apply barrier coat as necessary to produce paint systems indicated.
   b. Concrete Substrates: Remove release agents, curing compounds, efflorescence, and chalk. Do not paint surfaces if moisture content or alkalinity of surfaces to be painted exceeds that permitted in manufacturer's written instructions.
   c. Steel Substrates: Remove rust and loose mill scale. Clean using methods recommended in writing by paint manufacturer.
   d. Galvanized Metal Substrates: Remove grease and oil residue from galvanized sheet metal fabricated from coil stock by mechanical methods to produce clean, lightly etched surfaces that promote adhesion of subsequently applied paints.
   e. Aluminum Substrates: Remove surface oxidation.
2. Power Washing:
   a. Loxon Self cleaning Acrylic:
      1) 1 Coat Loxon LX02 Masonry Primer
      2) 2 coats Loxon Self Cleaning Acrylic LX13-50

D. Mildew and Mold Removal: Remove mildew and mold by high power washing (pressure range of 1500 to 4000 psi) with solution of trisodium phosphate and bleach. If substrate is too soft for high power washing, scrub substrate with solution. Rinse with clean water and allow surface to dry.

E. Protective Coverings: Provide protections for duration of the work, including covering furnishings and decorative items. Protect and mask adjacent finishes and components against damage, marking, overpainting, and injury. Clean and repair or replace damage caused by painting.

F. Renovated Surfaces:
1. Clean surface free of loose dirt and dust. Except at gypsum board surfaces, remove existing paint and coatings to bare substrate and prepare substrates to receive new paint system. Test substrate to verify it will bond with primer and receive new paint system without failure. If test fails, clean surface to base substrate and apply barrier coat. Retest to verify surface will accept new paint system:
   a. Remove surface film preventing proper adhesion and bond.
   b. Wash glossy paint with a solution of sal soda and rinse thoroughly.
   c. Remove loose, blistered, and defective paint and varnish; smooth edges with sandpaper.

d. Clean corroded iron and steel surfaces.
e. Repair and blend into portland cement plaster.
f. Prime bare surfaces.
g. Tone varnished surfaces with stain bringing to uniform color.
h. If existing surfaces cannot be put in acceptable condition for finishing by customary cleaning, sanding, and puttying operations, notify Owner and do not proceed until correcting unsatisfactory conditions.

G. Cementitious Substrates:
1. Prepare concrete surfaces to receive paint. Remove efflorescence, chalk, dust, dirt, grease, oils, release agents, mold, mildew, and existing paint. Roughen as necessary to remove glaze. If hardeners or sealers have been used to improve curing, use mechanical methods of surface preparation:
   a. Use abrasive blast cleaning methods if recommended by paint manufacturer.
   b. Do not paint surfaces if moisture content or alkalinity of surfaces exceeds that permitted in manufacturer's written instructions:
      1) Determine alkalinity and moisture content of surfaces by performing appropriate pH testing. If surfaces are sufficiently alkaline to cause the finish paint to blister and burn, correct condition prior to application of paint.
      2) Anhydrous Calcium Chloride Test: ASTM F1869. Proceed with installation after substrates have maximum moisture-vapor-emission rate of 3 lb of water/1000 sq. ft. (1.36 kg of water/92.9 sq. m).
      3) Relative Humidity Test: Using in situ probes, ASTM F2170. Proceed with installation after substrates have obtained percent relative humidity level recommended by paint manufacturer.
      4) Perform additional moisture tests when recommended by manufacturer. Proceed with installation when moisture content complies with that permitted in manufacturer's written instructions.
      5) Remove stains caused by weathering of corroding metals with solution of sodium metasilicate after thoroughly wetting with water. Allow to thoroughly dry.
2. Clean concrete floors to receive paint or coating with a 5 percent solution of muriatic acid or etching cleaner. Flush floors with clean water to remove acid; neutralize with ammonia, rinse, allow to dry; vacuum before painting.

H. Ferrous Metals:
1. Clean ungalvanized ferrous metal surfaces that have not been shop coated; remove oil, grease, dirt, loose mill scale, and other foreign substances. Use solvent or mechanical cleaning methods that comply with SSPC recommendations:
   a. Blast steel surfaces clean as recommended by paint system manufacturer and according to SSPC-SP 6/NACE No. 3.
   b. Treat bare and sandblasted or pickled clean metal with a metal treatment wash coat before priming.
   c. Touch up bare areas and shop-applied prime coats that have been damaged. Wire brush, clean with solvents recommended by paint manufacturer, and touch up with same primer as the shop coat.

I. Galvanized Ferrous Metal Substrates: Clean galvanized surfaces with nonpetroleum based solvents leaving surface free of oil and surface contaminants. Remove pretreatment from galvanized sheet metal fabricated from coil stock by mechanical methods to produce clean, lightly etched surfaces that promote adhesion of subsequently applied paints.

J. Shop Primed Steel Substrates: Clean field welds, bolted connections, and areas where shop paint is abraded. Paint exposed areas with the same material as used for shop priming to comply with SSPC-PA 1 for touching up shop primed surfaces.

K. Aluminum Substrates: Clean surfaces to remove oil, grease, surface oxidation, and contaminants in accordance with SSPC SP-1 Solvent Cleaning. Lightly abrade surface with a nonmetallic pad.

L. Masonry Substrates: Remove efflorescence and chalk. Do not paint surfaces if moisture content or alkalinity of surfaces or mortar joints exceeds that permitted in manufacturer's written instructions.

M. Plaster/Stucco Substrates:
1. Remove contaminants, release agents, curing compounds, efflorescence, chalk, mold, mildew, and similar deterrents. Spot patch existing plaster to eliminate blisters, buckles, excessive crazing, and to check cracking, dryouts, efflorescence, sweat outs, and similar deflects the prevent plaster from bonding with paint or coatings. Sand or texture repair or patch to match adjacent finish and to remove trowel marks and arises:
   a. Fill hairline cracks, small holes, and imperfections with latex patching plaster. Make smooth and flush with adjacent surfaces. Wash and neutralize high alkali surfaces.
   b. Deep Cracks: Clean out and fill deep cracks with latex patching plaster. Make smooth and flush with adjacent surfaces. Wash and neutralize high alkali surfaces.
   c. Do not paint surfaces if moisture content or alkalinity of surfaces exceeds that permitted in manufacturer's written instructions. Test for alkali using litmus paper.
   d. Allow patching and repair compounds to set and cure before painting.

N. Gypsum Board Surfaces: Fill minor defects with filler compound. Spot prime defects after repair.

O. Wood Substrates:
1. Scrape and clean small, dry, seasoned knots, and apply a thin coat of white shellac or recommended knot sealer before applying primer. After priming, fill holes and imperfections in finish surfaces with putty or plastic wood filler. Sand smooth when dried.
2. Sand surfaces that will be exposed to view and dust off.
3. Prime, stain, or seal wood to be painted. Prime edges, ends, faces, undersides, and back sides of wood, including cabinets, counters, cases, and paneling.
4. Seal tops, bottoms, and cutouts of unprimed wood doors with a heavy coat of varnish or sealer immediately on delivery.
5. After priming, fill holes and imperfections in the finish surfaces with putty or plastic wood filler. Sand smooth when dried.

P. Pipe Covering and Insulation: Clean to remove loose, foreign, and objectionable material before applying sealing coat.

Q. Preparation of Substrates for Wallcovering:
1. Prime and seal substrate with release coat in accordance with wallcovering manufacturer's recommendations for substrate:
   a. Assure compatibility with product of wall covering manufacturer.
   b. Fill indentations in substrate and prime with opaque white primer before applying release coat.
   c. Apply release coat in accordance with manufacturer's recommendations.

R. Barrier Coat: Provide barrier coats over incompatible primers or remove and reprime. Notify Owner in writing of anticipated problems using specified finish coat material over previously coated substrates.

S. Material Preparation:
1. Mix and prepare paint materials according to manufacturer's written instructions:
   a. Maintain containers used in mixing and applying paint in a clean condition, free of

foreign materials and residue.
b. Stir material before application to produce a mixture of uniform density. Stir as required during application. Do not stir surface film into material. If necessary, remove surface film and strain material before using.
c. Do not use thinners for water-based paints.
d. Tinting: Tint each undercoat a lighter shade to facilitate identification of each coat where multiple coats of the same material are applied. Tint undercoats to match the color of the finish coat but provide sufficient differences in shade of undercoats to distinguish each separate coat.

3.6 APPLICATION

A. Comply with manufacturer's written instructions and recommendations applicable to substrates and paint systems indicated:
1. The term exposed surfaces includes areas visible when permanent or built in fixtures, grilles, convector covers, covers for finned tube radiation, and similar components are in place. Extend coatings in these areas to maintain system integrity and provide desired protection.
2. Use applicators and techniques suited for paint and substrate indicated.
3. Provide finish coats compatible with primers.
4. Paint surfaces behind movable equipment and furniture same as similar exposed surfaces. Before final installation, paint surfaces behind permanently fixed equipment or furniture with prime coat only.
5. Paint exposed surfaces. If an item or a surface is not specifically mentioned, paint the item or surface the same as similar adjacent materials or surfaces:
   a. Field painting of exposed surfaces include bare and covered pipes and ducts (including color coding), hangers, exposed steel and iron supports, and surfaces of mechanical and electrical equipment that do not have a factory applied final finish.
   b. Areas visible when permanent or built in fixtures, grilles, convector covers, covers for finned tube radiation, and similar components are in place.
   c. Extend coatings in areas, as required, to maintain system integrity and provide desired protection.
6. Paint interior surfaces of ducts with a flat, nonspecular black paint where visible through registers or grilles.
7. Paint front and backsides of access panels, removable or hinged covers, and similar hinged items to match exposed surfaces.
8. Do not paint over dirt, rust, scale, grease, moisture, scuffed surfaces, or conditions detrimental to formation of a durable paint film. Do not paint over labels of independent testing agencies or equipment name, identification, performance rating, or nomenclature plates.
9. Do not paint over dirt, rust, scale, grease, moisture, scuffed surfaces, or conditions detrimental to formation of a durable paint film. Do not paint over labels of independent testing agencies or equipment name, identification, performance rating, or nomenclature plates.
10. Apply paints to produce surface films without cloudiness, spotting, holidays, laps, brush marks, roller tracking, runs, sags, ropiness, or surface imperfections. Cut in sharp lines and color breaks.
11. Finish exterior doors on tops, bottoms, and side edges the same as exterior faces.
12. Provide finish coats compatible with primers used.
13. Sand lightly between each succeeding enamel or varnish coat.

B. Items not to Receive Paint: Do not paint prefinished items, concealed surfaces, finished metal surfaces, operating parts, and labels.

C. Applicators:
1. Apply paints and coatings by brush, roller, spray, or applicators recommended by

manufacturer:
a. Brushes: Use brushes best suited for type of material applied. Use brush of appropriate size for surface or item being painted.
b. Rollers: Use rollers of carpet, velvet back, or high-pile sheep's wool recommended by manufacturer for material and texture required.
c. Spray Equipment: Use airless spray equipment with orifice size recommended by manufacturer for material and texture required.

D. Minimum Coating Thickness:
1. Apply paint materials no thinner than manufacturer's recommended spreading rate to achieve dry film thickness indicated. Provide total dry film thickness of the entire system as recommended by manufacturer:
a. Measure film thickness on magnetic surfaces by use of Elcometer thickness gauge and on nonmagnetic surfaces by pit gauge or Tooke Gauge.

E. Application:
1. Apply first coat to surfaces (top, bottom, sides, edges, underneath) that have been cleaned, pretreated, or prepared for painting as soon as practicable after preparation and before subsequent surface deterioration:
a. The number of coats and film thickness required are the same regardless of application method. Do not apply succeeding coats until previous coat has cured as recommended by manufacturer.
b. Primers specified in painting schedules may be omitted on items that are factory primed or factory finished after removing rust and scale and priming or touching up surface sand if acceptable to topcoat manufacturers.
c. If undercoats, stains, or conditions show through final coat of paint, apply additional coats until paint film is of uniform finish, color, and appearance. Give special attention to ensure edges, corners, crevices, welds, and exposed fasteners receive dry film thickness equivalent to that of flat surfaces.
d. Allow sufficient time between successive coats to permit proper drying. Do not recoat surfaces until paint has dried and cured to where it feels firm and does not deform or feel sticky under moderate thumb pressure, and until application of another coat of paint does not cause undercoat to lift or lose adhesion.

F. Mechanical and Electrical Work:
1. Painting of mechanical and electrical work is limited to items exposed in equipment rooms and occupied spaces:
a. Remove unfinished louvers, grilles, covers, and access panels on mechanical and electrical components and paint separately.
b. Prime and paint uninsulated and exposed pipes, conduit, boxes, insulated and exposed ducts, hangers, brackets, collars and supports, heat exchangers, tanks, ductwork, conduit, switchgear, and paintable insulation except where items are prefinished.
c. Paint interior surfaces of air ducts, and convector and baseboard heating cabinets visible through grilles and louvers with one coat of flat black paint, to visible surfaces. Paint dampers exposed behind louvers, grilles, and convector and baseboard cabinets to match face panels.
d. Paint both sides and edges of plywood backboards for electrical and telephone equipment before installing equipment.
e. Color code equipment, piping, conduit, and exposed duct work in accordance with requirements indicated. Color band and identify with flow arrows, names, and numbering.
f. Reinstall electrical cover plates, hardware, light fixture trim, escutcheons, and fittings removed prior to finishing.
g. Concealed Members: Wherever steel and metal parts to receive paint are built into and concealed by construction, paint as specified for exposed parts so finish

painting is complete before members are concealed.

G. Fire Suppression, Plumbing, HVAC, Electrical, Communication, and Electronic Safety and Security Work:
   1. Painting is limited to items exposed in equipment rooms and occupied spaces:
      a. Remove unfinished louvers, grilles, covers, and access panels on mechanical and electrical components and paint separately.
      b. Prime and paint uninsulated and exposed pipes, conduit, boxes, insulated and exposed ducts, hangers, brackets, collars and supports, heat exchangers, tanks, ductwork, conduit, switchgear, and paintable insulation except where items are prefinished.
      c. Paint interior surfaces of air ducts, and convector and baseboard heating cabinets visible through grilles and louvers with one coat of flat black paint, to visible surfaces. Paint dampers exposed behind louvers, grilles, and convector and baseboard cabinets to match face panels.
      d. Paint both sides and edges of plywood backboards for electrical and telephone equipment before installing equipment.
      e. Color code equipment, piping, conduit, and exposed duct work in accordance with requirements indicated. Color band and identify with flow arrows, names, and numbering.
      f. Reinstall electrical cover plates, hardware, light fixture trim, escutcheons, and fittings removed prior to finishing.

H. Electrostatic Spray Painting:
   1. Apply coating electrostatically to finished surfaces, free from runs, sags, visible overlaps, holidays, craters, pinholes and other defects detrimental to protective and decorative qualities of coating:
      a. Thickness of Coatings: 1.5 to 2.0 mils dry film thickness. Measure dry film thickness with magnetic gauge.
      b. Use application techniques, equipment, materials, and preparation procedures recommended by manufacturer.

I. Block Fillers: Apply block fillers to concrete masonry block at rate to ensure complete coverage with pores filled.

J. Prime Coats: Before applying finish coats, apply prime coat, recommended by manufacturer, to material required to be painted or finished and that has not been prime coated by others. Recoat primed and sealed surfaces where evidence of suction spots or unsealed areas in first coat appears, to ensure a finish coat with no burn through or defects due to insufficient sealing.

K. Finish Coats:
   1. Apply paints to produce surface films without cloudiness, spotting, holidays, laps, brush marks, roller tracking, runs, sags, ropiness, or other surface imperfections. Cut in sharp lines and color breaks. If undercoats or other conditions show through topcoat, apply additional coats until cured film has a uniform paint finish, color, and appearance without bleed through:
      a. Pigmented (Opaque) Finishes: Completely cover surfaces as necessary to provide a smooth, opaque surface of uniform finish, color, appearance, and coverage. Cloudiness, spotting, holidays, laps, brush marks, runs, sags, ropiness, or surface imperfections is not acceptable.
      b. Transparent (Clear) Finishes: Use multiple coats to produce glass smooth surface film of even luster. Provide a finish free of laps, cloudiness, color irregularity, runs, brush marks, orange peel, nail holes, or other surface imperfections. Provide satin finish for final coats.

L. Completed Work: Match approved samples for color, texture, and coverage. Remove, refinish, or repaint work not complying with requirements.

M. Touch Up:
1. Touch up marred, scraped, and blemished areas of surfaces which were factory primed or previously coated:
   a. Prepare and touch up scratches, abrasions, and blemishes and remove foreign matter before proceeding with succeeding coats.
   b. Touch up marred, scraped, and blemished areas of factory primed or previously coated surfaces.
   c. Feather touch up coating overlapping minimum 2 inches onto adjacent unblemished areas producing smooth, uniform surface.
   d. As soon after erection and installation as possible, touch up fasteners, welded surfaces and surroundings, field connections, and areas on which shop coat has been abraded or damaged with specified primer before corrosion and other damage occurs from exposure.

3.7 FIELD QUALITY CONTROL

A. Dry Film Thickness (DFT) Testing:
1. Tests for dry film thickness may be determined by using a Tooke Scale and microgroover, an electronic scanner, or the Owner may engage the services of a qualified testing and inspecting agency to inspect and test paint for dry film thickness:
   a. Contractor shall touch up and restore painted surfaces damaged by testing.
   b. If test results show that dry film thickness of applied paint does not comply with paint manufacturer's written recommendations, Contractor shall pay for testing and apply additional coats as needed to provide dry film thickness that complies with paint manufacturer's written recommendations.

3.8 CLEANING AND PROTECTION

A. It is of the upmost importance to the AISD that the site remains in a safe, clean, and well-maintained condition. At the end of each day, leave the site ready to use by staff and students. Protect staff and students and the learning environment throughout the work.

B. Cleanup: At the end of each day, remove empty cans, rags, rubbish, and discarded paint materials from site. After completion of painting work, clean glass and paint spattered surfaces. Remove spattered paint by washing and scraping without scratching or damaging adjacent finished surfaces.

C. Protect work of other trades against damage from paint application. Correct damage to work of other trades by cleaning, repairing, replacing, and refinishing, as approved by Architect, and leave in an undamaged condition.

D. Provide Wet Paint signs to protect newly painted finishes. After completing painting operations, remove temporary protective wrappings provided by others to protect their work. After related work is complete, touch up and restore damaged or defaced painted surfaces. Comply with procedures specified in PDCA P1.

E. At completion of painting activities, touch up and restore damaged or defaced painted surfaces.

F. Waste Management: Legally dispose of unused paint and paint containers in accordance with manufacturer’s recommendations and environmental regulations.

PART 4 SCHEDULES

A. The following is a schedule of typical painted items and does not specifically include every item that is to receive paint but should establish type and quality of finish for all items normally included in a complete paint job.

B. Exterior Surfaces (Note: Exterior surfaces are divided into two (2) different categories, based upon color and level of graffiti resistance required. System 1 will be used when standard earthtone colors or neutral colors are specified, and System 2 will be used when bright colors (primary reds, yellows, and oranges) are specified and/or when a graffiti resistant coating is required.):
   1. Galvanized Metal:
      c. Surface Preparation: Acid etch galvanized surfaces that have not weathered at least six (6) months prior to beginning painting operations.
      d. Primer: One (1) coat Pro-Cryl Pro Industrial Universal Primer (B66W310)
      e. Finish: Two (2) coats Sher-Cryl HPA High Performance Acrylic (B66W300)
   2. Galvanized Metal - Chloramine environment:
      f. Surface Preparation: Acid etch galvanized surfaces that have not weathered at least six (6) months prior to beginning painting operations.
      g. Finish: One coat Macropoxy 646 (B58-600), two (2) coats PI WB Acrolon Urethane.
   3. Un-galvanized Metal:
      h. Primer: One (1) coat Pro-Cryl Pro Industrial Universal Primer (B66W310).
      i. Finish: Two (2) coats Sher-Cryl HPA High Performance Acrylic (B66W300).
   4. Concrete and CMU:
      j. Primer/Finish: (2) coats Loxon XP Exterior Waterproofing System, 14-18 mils wet, 6.4 – 8.3 mils dry per coat.
   5. Wood (Includes plywood siding and wooden trim):
      k. Primer: One (1) coat A-100 Ext. Latex Wood Primer (B42).
      l. Finish: Two (2) coats A-100 Acrylic Gloss (A8 ser.).
   6. Fiber-Cement Materials:
      m. Primer: One (1) coat Loxon Masonry Primer (A24W300).
      n. Finish: Two (2) coats A-100 Acrylic Gloss (A8 Series).
   7. Parking Line and Driveway Paint: Setfast Waterborne Yellow (TM225) (meets Federal Specification (FS) TTP-1952-B).
   8. All piping in mechanical rooms shall be painted in their entirety, in the following colors:
      o. Gas lines: Orange
      p. Domestic cold water: White
      q. Domestic hot water: Pink
      r. Heating hot water: Red
      s. Condenser water: Green
      t. Chilled water: Blue

C. Interior Surfaces:
   1. Galvanized Metal:
      u. Primer: One (1) coat Pro-Cryl Pro Industrial Universal Primer (B66W310).
      v. Finish: Two (2) coats Pro Industrial 0 VOC Acrylic Semi-Gloss.
   2. Shop-Primed Ferrous Metals (Use for metal doors and frames and miscellaneous metal items):
      w. Shop coat by others.
      x. One (1) coat over Steel and Aluminum, Pro Industrial Pro-Cryl Universal Primer (B66W610).
      y. Two (2) coats Pro Industrial Acrylic Semi-Gloss, B66 Series.
   3. Gypsum Wallboard & Ceiling board:
      z. Primer: One (1) coat ProMar 200 Zero VOC Latex Primer (B28W2600).
      aa. Finish: Two (2) coats ProMar 200 Zero VOC Latex Semi-Gloss (B20W2651

Series).

bb. Alternate:
1) Primer: One (1) coat ProMar 200 Zero VOC Latex Primer (B28W2600).
2) Finish: Microbicidial Paint: SuperPaint Satin Sanitizing (EPA# 64695-1).
a) Substitutions must meet EPA #64695-1.

4. Primer Concrete and CMU (Enamel):
cc. One (1) coat ProMar Block Filler (AB25W25).
dd. Finish: Two (2) coats ProMar 200 Zero VOC Latex Semi-Gloss (B31W2651 Series).

5. Wood (Painted):
ee. Primer: Premium Wall and Wood Primer (B25W8111).
ff. Finish: ProClassic Waterborne Semi-Gloss (B31 Series).

6. Wood (Stained):
gg. Stain: Minwax stain.
hh. Finish (First Coat): Wood Classics Polyurethane Varnish (A67 Series).
ii. Finish (Second Coat): Wood Classics Polyurethane Varnish (A67 Series).

7. Gypsum Wallboard & Ceiling board (Epoxy) – Kitchens, bathrooms, laboratories, etc.:
jj. Primer: One (1) coat ProMar 200 Zero VOC Latex Primer (B28W2600).
kk. Finish: Two (2) coats Pro Industrial Waterbased Epoxy, Semi-Gloss (B73 Series).

OR

ll. Finish - Two (2) coats Pro Industrial Pre-Catalyzed, Semi-Gloss (K45 Series):
1) Location: Corridors & Stairwells.

8. CMU (Epoxy) - Kitchens, bathrooms, laboratories, etc.:
mm. Primer: Two (2) coats Heavy Duty Block Filler (B42W46).
nn. Finish: Two (2) coats Pro Industrial Waterbased Epoxy, Semi-Gloss (B73 Series).

9. Pipe and fittings, including but not limited to copper and brass, at kitchen areas (but excluding aluminum, stainless steel, nickel and chrome plated pipe and fittings):
oo. Primer: One (1) coat; product recommended for the substrate by the finish coat manufacturer.
pp. Finish: Two (2) coats bright aluminum paint, S-W BondPlex Aluminum (B71S200).

END OF SECTION 09 90 00

SECTION 09 97 23 CONCRETE AND MASONRY COATINGS

PART 1 GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Application of membrane type curing and sealing compound on concrete surfaces to remain exposed.

B. Related Sections:
1. Section 09 90 00: Painting.
2. Section 09 96 23: Graffiti-Resistant Coatings.

1.3 DEFINITIONS

A. Comparable Product: Product demonstrated and approved through submittal process, or where indicated as a produce substitution, to have the indicated qualities related to type, function, dimension, in-service performance, physical properties, appearance, and other characteristics that equal or exceed those of specified product.

1.4 SUBMITTALS

A. Application of membrane type curing and sealing compound on concrete surfaces to remain exposed.

1.5 DELIVERY, STORAGE, AND HANDLING

A. Deliver materials to site in manufacturer's original, unopened containers and packaging, with labels clearly identifying product name and manufacturer.

B. Store materials in a clean, dry area in accordance with manufacturer's instructions.

C. Keep product from freezing.

D. Avoid direct contact with this product as it may cause mild-to-moderate irritation of the eyes and/or skin.

E. Protect materials during handling and application to prevent damage or contamination.

F. Do not mix any compound containing solvent.

G. Do not mix or agitate aggressively as foaming can occur.

PART 2 PRODUCT

2.1 MANUFACTURERS

A. Basis of design is Vocomp-20, as manufactured by W.R. Meadows, Inc., or comparable

product approved by Architect:

1. Other manufacturers must have a minimum of five (5) years' experience manufacturing products meeting or exceeding the specifications and comply with Division 01 requirements regarding substitutions to be considered and have Architect's approval prior to its use on the Project:
   a. Dayton-Superior Corp.
   b. Euclid Chemical Company.

2.2 MATERIALS

A. Typical, except as noted: Membrane type curing and sealing compound conforming to ASTM C309, Standard Specification for Liquid Membrane-Forming Compounds for Curing Concrete, Type I, Class B and complying with Sealtight Vocomp-20, as manufactured by W.R. Meadows, Inc., 2300 W. Valley Blvd., Pomona, CA 91768, Phone: (909) 469-2606, Fax: (909) 469-2611 or comparable product approved by the Architect.

B. Exterior Non-slip Traffic Coating: Vocomp-20 as specified above, with "Sure-Step" slip-resistant additive as manufactured by W.R. Meadows, Inc., 2300 W. Valley Blvd., Pomona, CA 91768, Phone: (909) 469-2606, Fax: (909) 469-2611 or comparable product approved by the Architect.

PART 3 EXECUTION

3.1 EXAMINATION

A. Examine surfaces to receive curing and sealing compound. Notify architect if surfaces are not acceptable. Do not begin surface preparation or application until unacceptable conditions have been corrected

3.2 PREPARATION

A. Protect adjacent surfaces not designated to receive curing and sealing compound.

B. Clean and prepare surfaces to receive curing and sealing compound in accordance with manufacturer's instructions.

C. Ensure concrete surface is clean and dry, with all stains, oil, grease, dust, and dirt removed.

D. Concrete surface water should be dissipated when used on new concrete.

E. Concrete surfaces should not be marred by walking workers.

3.3 APPLICATION

A. Apply curing and sealing compound in accordance with manufacturer's instructions.

B. Ensure product is mixed for optimum performance. Avoid aggressive mixing as foaming may occur.

C. Use an industrial sprayer with a 5916 tip that produces a flow rate of 1/10 of one gallon per minute under 0.276 MPa (40 psi) of pressure.

D. Spray on in a fine, fog pattern, without spurts and dribbles, to form a thin, continuous film.

E. Alternatively apply using a lint-free roller or lamb's wool roller.

F. Avoid puddling in low areas.

END OF SECTION 09 97 23

SECTION 10 11 00 MARKERBOARD AND TACKBOARD

PART 1 GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section includes requirements including but not limited to:
   1. Visual display board assemblies.
   2. Glass markerboards.
   3. Display rails.
   4. Accessories necessary for a complete installation.

B. Related Sections:
   1. Section 03 30 00: Cast-In-Place Concrete.
   2. Section 06 10 00: Rough Carpentry.
   3. Section 09 21 16: Gypsum Board Assemblies.
   4. Section 09 90 00: Painting and Coating.

1.3 SUBMITTALS

A. Product Data:
   1. Technical data for each type of product including construction details, material descriptions, dimensions of individual components and profiles, finishes, and accessories for visual display units:
      a. Include electrical characteristics for motorized units.

B. Shop Drawings:
   1. Submit plans, elevations, sections, details, and attachment to other work:
      a. Indicate sizes and layout, method of attachment, accessories, trim, details and finish.
      b. Show locations of panel joints. Show locations of field assembled joints for factory fabricated units too large to ship in one piece.
      c. Show locations and layout of special purpose graphics.
      d. Include sections of typical trim members.
      e. Include wiring diagrams for power and control wiring.

C. Samples:
   1. Submit for each type of visual display unit indicated:
      a. Visual Display Panel: Not less than 8-1/2 inches by 11 inches (215 mm by 280 mm), with facing, core, and backing indicated for final work. Include one panel for each type, color, and texture required.
      b. Trim: 6 inch (150 mm) long sections of each trim profile.
      c. Display Rail: 6 inch (150 mm) long section of each type.
      d. Modular Support System: 6 inch (152 mm) long sections.
      e. Accessories: Full size Sample of each type of accessory.

D. Product Test Reports: Based on evaluation of comprehensive tests performed by a qualified testing agency, for surface burning characteristics of tackboards.

1.4 QUALITY ASSURANCE

A. Regulatory Requirements:
   1. Surface Burning Characteristics:
      a. Comply with ASTM E84; testing by a qualified testing agency. Identify products with appropriate markings of applicable testing agency:
         1) Flame Spread Index: 25 or less.
         2) Smoke Developed Index: 450 or less.
   2. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.
   3. Accessibility Requirements:
      a. Comply with applicable requirements:
         1) Americans with Disabilities Act of 1990, as amended:
            a) ADA Title II Regulations & the 2010 ADA Standards for Accessible Design.
         2) 2022 California Building Code (CBC) (CCR Title 24, Part 2, as adopted and amended by DSA):
            a) CBC Chapter 11B, Public Buildings, Public Accommodations, Commercial Buildings, and Public Housing.

B. Installer Qualifications: Entity having minimum 5 years documented experience that employs installers and supervisors who are trained and approved by manufacturer.

C. Source Limitations: Obtain each type of visual display unit from single source from single manufacturer.

D. Mockups:
   1. Build mockups to demonstrate aesthetic effects and to set quality standards for fabrication and installation:
      a. Build mockup of typical wall area or visual display unit and floor to ceiling visual display assembly as shown on Drawings. Include accessories and temporary power.
      b. Approval of mockups does not constitute approval of deviations from the Contract Documents contained in mockups unless Architect specifically approves such deviations in writing.
      c. Subject to compliance with requirements, approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.

E. Pre-installation Conference: Conduct conference at site.

1.5 WARRANTY

A. Porcelain Enamel Face Sheets:
   1. Written warranty in which Manufacturer agrees to repair or replace porcelain enamel face sheets that fail in materials or workmanship within specified warranty period:
      a. Failures include, but are not limited to, the following:
         1) Surfaces lose original writing and erasing qualities.
         2) Surfaces exhibit crazing, cracking, or flaking.
         3) Noticeable deterioration of finish.
         4) Writing surface delamination.
         5) Fabric discoloration, tearing, or delamination.
         6) Unit releasing from substrate.
   2. Warranty Period: 5 years from date of Substantial Completion.

1.6 DELIVERY, STORAGE, AND HANDLING

A. Deliver factory fabricated visual display units completely assembled in one piece. If dimensions exceed maximum manufactured unit size, or if unit size is impracticable to ship in one piece, provide two or more pieces with joints in locations indicated on approved Shop Drawings.

PART 2 PRODUCTS

2.1 MANUFACTURER

A. NACO.

B. Equivalent manufacturers on approval.

2.2 MATERIALS

A. Porcelain Enamel Face Sheet: PEI-1002, with face sheet two or three coat process.

B. High Pressure Plastic Laminate: NEMA LD 3.

C. Natural Cork Sheet: Seamless, single layer, compressed fine grain cork sheet; bulletin board quality; face sanded for natural finish with surface burning characteristics indicated.

D. Plastic Impregnated-Cork Sheet: Seamless, homogeneous, self-sealing sheet consisting of granulated cork, linseed oil, resin binders, and dry pigments that are mixed and calendared onto fabric backing; with washable vinyl finish and integral color throughout with surface-burning characteristics indicated.

E. Vinyl Fabric: Mildew resistant, washable, complying with FS CCC-W-408D, Type II, burlap weave; weighing not less than 13 oz./sq. yd. (440 g/sq. m); with surface burning characteristics indicated.

F. Polyester Fabric: Nondirectional weave, 100 percent polyester; weighing not less than 15 oz./sq. yd. (508 g/sq. m); with surface-burning characteristics indicated.

G. Hardboard: ANSI A135.4, tempered.

H. Particleboard: ANSI A208.1, Grade M-1.

I. Medium Density Fiberboard: ANSI A208.2, Grade 130.

J. Fiberboard: ASTM C208 cellulosic fiber insulating board.

K. Clear Tempered Glass: ASTM C1048, Kind FT, Condition A, Type I, Class 1, Quality Q3, with exposed edges seamed before tempering.

L. Extruded Aluminum: ASTM B221, Alloy 6063.

M. Adhesives for Field Application: Mildew-resistant, nonstaining adhesive for use with specific type of panels, sheets, or assemblies; and for substrate application; as recommended in writing by visual display unit manufacturer.

N. Primer/Sealer: Mildew resistant primer/sealer recommended in writing by visual display unit manufacturer for intended substrate.

2.3 VISUAL DISPLAY BOARD ASSEMBLY

A. Manufacturers:
   1. Subject to compliance with requirements, provide products by one of the following:
      a. ABC School Equipment, Inc.
      b. ADP.
      c. AJW Architectural Products.
      d. Architectural School Products Ltd.
      e. Best-Rite; MooreCo, Inc.
      f. Claridge Products and Equipment, Inc.
      g. Egan Visual Inc.
      h. EverWhite.
      i. Ghent Manufacturing, Inc.
      j. Marsh Industries, Inc.
      k. Nelson Adams, Inc.
      l. Peter Pepper Products, Inc.
      m. Platinum Visual Systems.
      n. Comparable product.

B. Visual Display Board Assembly:
   1. Field or factory fabricated:
      a. Assembly: Markerboard, and tackboard.
      b. Corners: Square.
      c. Width: Indicated on Drawings.
      d. Height: Indicated on Drawings.
      e. Mounting Method: Direct to wall or Modular support system.

C. Markerboard Panel:
   1. Single:
      a. High pressure laminate faced markerboard panel on core indicated:
         1) Color: White

D. Tackboard Panel:
   1. Vinyl fabric faced tackboard panel on core indicated:
      a. Fabric Wrapped Edge: Wrap edge of tackboard panel with fabric facing.
      b. Color and Pattern: Selected by Architect.

E. Aluminum Frames:
   1. Fabricated from not less than 0.062 inch (1.57 mm) thick, extruded aluminum; slim size and standard shape of size and shape indicated on Drawings:
      a. Field Applied Trim: Snap on trim with no visible screws or exposed joints
      b. Aluminum Finish: Clear anodic finish.
      c. Color and Pattern: Selected by Architect.

F. Factory Applied Wood Trim: Red oak not less than 1/2 inch (13 mm) thick; standard size and shape with transparent finish.

G. Vinyl Trim: Selected by Architect.

H. Joints: Make joints only where total length exceeds maximum manufactured length. Fabricate with minimum number of joints, balanced around center of board as indicated on approved Shop Drawings.

I. Combination Assemblies: Provide hidden spline between abutting sections of visual display panels.

J. Chalktray:
   1. Continuous:
      a. Box Type: Extruded aluminum with slanted front, grooved tray, and cast aluminum end closures.
      b. Solid Type: Extruded aluminum with ribbed section and smoothly curved exposed ends.

K. Display Rail:
   1. Extruded aluminum display rail with plastic impregnated cork insert, end stops, and continuous paper holder, designed to hold accessories:
      a. Size: 2 inches (50 mm) high by length indicated on Drawings.
      b. Map Hooks: Two map hooks for every 48 inches (1200 mm) of display rail or fraction thereof.
      c. Map Hooks and Clips: Two map hooks with flexible metal clips for every 48 inches (1200 mm) of display rail or fraction thereof.
      d. Tackboard Insert Color: Selected by Architect.
      e. Aluminum Color: Match finish of visual display assembly trim.

L. Paper Holder Display Rail: Extruded aluminum; designed to hold paper by clamping action.

M. Special Purpose Graphics: Fuse or paint semivisible writing guidelines, penmanship lines, music staff lines, grid, 1 inch (25 mm) square, rectangular graph coordinates, [polar graph coordinates] [horizontal lines, 2 inches (50 mm) o.c., graphic onto surface of porcelain enamel visual display unit. Exact location to be determined by District.

2.4 VISUAL DISPLAY ASSEMBLIES

A. Manufacturers:
   1. Subject to compliance with requirements, provide products by one of the following:
      a. AJW Architectural Products.
      b. Claridge Products and Equipment, Inc.
      c. Egan Visual Inc.
      d. Platinum Visual Systems.

B. Markerboard Panel Assemblies:
   1. Consisting of markerboard panels with high pressure laminate facing on core indicated, fabricated for floor-to-ceiling assemblies:
      a. Color: Selected by Architect.

C. Tackboard Panel Assemblies:
   1. Consisting of tackboard panels with vinyl fabric or polyester fabric facing on core indicated, fabricated for floor to ceiling assemblies:
      a. Edge Treatments:
         1) Panel Joint Edges: Wrapped with fabric.
         2) Top of Wall Edges: Wrapped with fabric.
         3) Bottom of Wall Edges: Wrapped with fabric.
         4) Corners: Wrapped with fabric.
      b. Color: Selected by Architect.

D. Width: As indicated on Drawings.

E. Height: As indicated on Drawings.

F. Joint Accessories: Unless otherwise indicated concealed aluminum or steel spline at butt joints.

2.5 VISUAL DISPLAY CONFERENCE UNITS

A. Manufacturers:
   1. Subject to compliance with requirements, provide products by one of the following:
      a. A-1 Visual Systems.
      b. AARCO Products, Inc.
      c. Architectural School Products Ltd.
      d. Best-Rite; MooreCo, Inc.
      e. Claridge Products and Equipment, Inc.
      f. Egan Visual Inc.
      g. Ghent Manufacturing, Inc.
      h. Marsh Industries, Inc.
      i. Peter Pepper Products, Inc.
      j. Platinum Visual Systems.

2.6 FINISH REQUIREMENTS

A. Comply with NAAMM *Metal Finishes Manual for Architectural and Metal Products* for recommendations for applying and designating finishes.

B. Protect mechanical finishes on exposed surfaces from damage by applying a strippable, temporary protective covering before shipping.

C. Appearance of Finished Work: Noticeable variations in same piece are unacceptable. Variations in appearance of adjoining components are acceptable if they are within the range of approved Samples and are assembled or installed to minimize contrast.

D. Aluminum Finishes:
   1. Clear Anodic Finish: AAMA 611, AA-M12C22A31, Class II, 0.010 mm or thicker.
   2. Color Anodic Finish: AAMA 611, AA-M12C22A32/A34, Class II, 0.010 mm or thicker.
   3. Baked Enamel or Powder Coat Finish: AAMA 2603, except with a minimum dry film thickness of 1.5 mils (0.04 mm). Comply with coating manufacturer's written instructions for cleaning, conversion coating, and applying and baking finish.

PART 3 EXECUTION

3.1 PROJECT CONDITIONS

A. Environmental Limitations: Do not deliver or install visual display units until spaces are enclosed and weathertight, wet work in spaces is complete and dry, work above ceilings is complete, and temporary HVAC system is operating and maintaining ambient temperature and humidity conditions at occupancy levels during the remainder of the construction period.

B. Field Measurements:
   1. Verify actual dimensions of construction contiguous with visual display units by field measurements before fabrication:
      a. Allow for trimming and fitting where taking field measurements before fabrication might delay the Work.

3.2 EXAMINATION

A. Examine substrates and conditions for compliance with requirements for installation tolerances, surface conditions of wall, and other conditions affecting performance of the work.

B. Examine roughing in for electrical power systems to verify actual locations of connections before installation of motorized, sliding visual display units.

C. Examine walls and partitions for proper preparation and backing for visual display units.

D. Examine walls and partitions for suitable framing depth where sliding visual display units will be installed.

E. Proceed with installation after correcting unsatisfactory conditions.

3.3 PREPARATION

A. Comply with manufacturer's written instructions for surface preparation. Clean substrates of substances, such as dirt, mold, and mildew, that impair the performance of and affect the smooth, finished surfaces of visual display boards.

B. Prepare surfaces to achieve a smooth, dry, clean surface free of flaking, unsound coatings, cracks, defects, projections, depressions, and substances that will impair bond between visual display units and wall surfaces:
   1. Moisture Content: Maximum of 4 percent when tested with an electronic moisture meter.
   2. Prepare substrates indicated to receive glass writing surfaces required by manufacturer's written instructions to achieve a smooth, dry, clean, structurally sound surface that is uniform in color:
      a. Gypsum Board: Prime gypsum board with primer as recommended in writing by primer/sealer manufacturer and glass writing surface manufacturer.
      b. Painted Surfaces: Treat areas susceptible to pigment bleeding.

C. Prime wall surfaces indicated to receive visual display units, direct applied floor to ceiling visual display assemblies and as recommended in writing by primer/sealer manufacturer and visual display unit manufacturer.

D. Prepare recesses for sliding visual display units as required by type and size of unit.

3.4 INSTALLATION

A. Install visual display surfaces in locations and at mounting heights indicated on Drawings. Keep perimeter lines straight, level, and plumb. Provide grounds, clips, backing materials, adhesives, brackets, anchors, trim, and accessories necessary for complete installation.

B. Field Assembled Visual Display Board Assemblies:
   1. Coordinate field assembled units with grounds, trim, and accessories indicated. Join parts with a neat, precision fit:
      a. Make joints only where total length exceeds maximum manufactured length. Fabricate with minimum number of joints, balanced around center of board, as acceptable to Architect.
      b. Where size of visual display board assemblies or other conditions require support in addition to normal trim, provide structural supports or modify trim as indicated or as selected by Architect from manufacturer's standard structural support accessories to suit conditions indicated.
      c. Field Applied Aluminum Trim: Attach trim over edges of visual display boards and conceal grounds and clips. Attach trim to boards with fasteners at maximum 24 inches (610 mm) o.c.

C. Factory Fabricated Visual Display Board Assemblies:

1. Adhere to wall surfaces with egg size adhesive gobs at 16 inches (400 mm) o.c., horizontally and vertically:
   a. Field Applied Aluminum Trim - Attach trim over edges of visual display boards and conceal grounds and clips. Attach trim to boards with fasteners at maximum 24 inches (610 mm) o.c.
   b. Mounting - Height Install visual display units at mounting heights indicated on Drawings.

D. Factory Fabricated Visual Display Board Assemblies:
   1. Attach concealed clips, hangers, and grounds to wall surfaces and to visual display board assemblies with fasteners at not more than 16 inches (400 mm) o.c. Secure tops and bottoms of boards to walls:
      a. Field Applied Aluminum Trim - Attach trim over edges of visual display boards and conceal grounds and clips. Attach trim to boards with fasteners at maximum 24 inches (610 mm) o.c.
      b. Mounting Height - Install visual display units at mounting heights indicated on Drawings.

3.5 CLEANING AND PROTECTION

A. Clean visual display units according to manufacturer's written instructions. Attach one removable cleaning instructions label to visual display unit in each room.

B. Touch up factory applied finishes to restore damaged or soiled areas.

C. Cover and protect visual display units after installation and cleaning.

END OF SECTION 10 11 00

SECTION 10 12 00 DISPLAY CASES

PART 1 GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section Includes:
1. Bulletin boards.
2. Display cases.

1.3 DEFINITIONS

A. Bulletin Board: Glazed cabinet with tackboard panel, without shelves, typically of shallow depth for display of paper documents.

B. Display Case: Glazed cabinet with tackboard panel back surface and adjustable shelves.

C. Tackboard Panel: A material for holding push-pins or tacks typically consisting of a facing; such as fabric, vinyl, or cork; adhered to a substrate; such as fiberboard, hardboard, particleboard.

1.4 SUBMITTALS

A. Product Data - For each type of product:
1. Include construction details, material descriptions, dimensions of individual components and profiles, and finishes for display cases and bulletin boards. Include furnished specialties and accessories.
2. Include electrical characteristics for illuminated display cases and bulletin boards.

B. Shop Drawings - For display cases and bulletin boards:
1. Include plans, elevations, sections, and attachment details.
2. Show location of seams and joints in tackboard panels.
3. Include sections of typical trim members.
4. Include diagrams for wiring of illuminated display cases and bulletin boards.

C. Samples: For each exposed product and for each color and texture specified; not less than 8-1/2 by 11 inches (215 by 280 mm) for tackboard panels and 6 inches (150 mm) long for trim with factory finish.

D. Samples for Initial Selection - For each type of exposed finish:
1. Include Samples of tackboard panels, header panel and factory-finished trim involving color finish selection.

E. Samples for Verification - For each type of exposed finish for the following:
1. Tackboard Panel: Not less than 8-1/2 by 11 inches (215 by 280 mm), with facing and substrate indicated for final Work. Include one panel for each type, color, and texture required.
2. Trim: 6-inch- (150-mm-) long sections of each trim profile including corner section.

F. Maintenance Data: For display cases and bulletin boards to include in maintenance manuals.

1.5 QUALITY ASSURANCE

A. Pre-installation Conference: Conduct conference at Project site.

1.6 PERFORMANCE REQUIREMENTS

A. Surface-Burning Characteristics - Comply with ASTM E84; testing by a qualified testing agency. Identify products with appropriate markings of applicable testing agency:
   1. Flame-Spread Index: 25 Insert value or less.
   2. Smoke-Developed Index: 50 Insert value or less.

B. Electrical Components: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.

PART 2 PRODUCTS

2.1 MANUFACTURERS

A. Source Limitations: Obtain display cases and bulletin boards from single source from single manufacturer.

2.2 BULLETIN BOARD (AS INDICATED ON DRAWINGS)

A. Basis-of-Design Product is subject to compliance with requirements. Product is indicated on Drawings or comparable product by one of the following:
   1. A-1 Visual Systems.
   2. AARCO Products, Inc.
   3. ADP Lemco, Inc.
   4. APCO Graphics, Inc.
   5. Architectural School Products Ltd.
   6. Aristocrat Industries, Inc.
   7. Aywon.
   8. Best-Rite Manufacturing; A brand division of MooreCo, Inc.
   9. Claridge Products and Equipment, Inc.
   10. C. R. Laurence Co., Inc.
   11. Ghent Manufacturing, Inc.
   12. Marsh Industries, Inc.; Visual Products Group.
   13. Nelson-Harkins Industries.
   14. Newline Products, Inc.
   15. Peter Pepper Products, Inc.
   16. Platinum Visual Systems; a division of ABC School Equipment, Inc.
   17. Poblocki Sign Company.
   18. Sign International Inc.
   19. Signature, Inc.
   20. Swingframe Mfg; a division of Access Display Group, Inc.
   21. Tablet & Ticket Co. (The).
   22. Visiontron Corp.
   23. Vomar Products, Inc.
   24. Waddell Furniture; a division of Ghent Manufacturing, Inc.

B. General - Factory-fabricated unit consisting of manufacturer's standard wall-mounted cabinet with tackboard panel on back inside surface and operable glazed doors at front:

1. Frame and Cabinet Profile: Square frame section with square cabinet corners.
2. Mounting: Surface mounted.
3. Size: As indicated on Drawings.

C. Glazed Sliding Doors - Tempered glass; unframed; with extruded-aluminum top and bottom track; supported on nylon or ball-bearing rollers; with plastic top guide and rubber bumpers. Equip each door with ground finger pull and adjustable cylinder lock with two keys:
1. Thickness: Not less than 6 mm thick.
2. Number of Doors: Two.

D. Header Panel - Nonilluminated; with opaque acrylic sheet panel set within overall cabinet frame; with matching frame that separates header panel from bulletin board:
1. Graphic Content and Style: Provide header panel copy that complies with requirements indicated on Drawings for size, style, spacing, content, height, location, material, and colors of graphics.
2. Color: As selected by Architect from full range of industry colors.

E. Back Panel - Manufacturer's standard vinyl-fabric-faced tackboard panel:
1. Color: As selected by Architect from full range of industry colors.

2.3 TACKBOARD PANELS

A. Vinyl-Fabric-Faced Tackboard Panel: Vinyl fabric factory laminated to 1/2-inch- (13-mm-) thick fiberboard backing.

2.4 MATERIALS

A. Hardboard: ANSI A135.4, tempered.

B. Fiberboard: ASTM C208.

C. Particleboard: ANSI A208.1, Grade M-1, made with binder containing no urea formaldehyde, that complies with the testing and product requirements of the California Department of Public Health's (formerly, the California Department of Health Services') "Standard Method for the Testing and Evaluation of Volatile Organic Chemical Emissions from Indoor Sources Using Environmental Chambers."

D. Vinyl Fabric: FS CCC-W-408D, Type II, burlap weave Insert texture and pattern weighing not less than 13 oz./sq. yd. (440 g/sq. m); with flame-spread index of 25 or less when tested according to ASTM E84.

E. Extruded-Aluminum Bars and Shapes: ASTM B221, Alloy 6063.

F. Clear Tempered Glass: ASTM C1048, Kind FT, Condition A, Type I, Class 1, Quality Q3, with exposed edges seamed before tempering.

G. High-Pressure Plastic Laminate: NEMA LD 3.

H. Fasteners: Provide screws, bolts, and other fastening devices made from same material as items being fastened, except provide hot-dip galvanized, stainless-steel, or aluminum fasteners for exterior applications. Provide types, sizes, and lengths to suit installation conditions. Use security fasteners where exposed to view.

I. Adhesives: Manufacturer's standard product that complies with the testing and product requirements of the California Department of Public Health's (formerly, the California

Department of Health Services') "Standard Method for the Testing and Evaluation of Volatile Organic Chemical Emissions from Indoor Sources Using Environmental Chambers."

2.5 FABRICATION

A. Fabricate bulletin boards and display cases to requirements indicated for dimensions, design, and thickness and finish of materials.

B. Use metals and shapes of thickness and reinforcing required to produce flat surfaces, and to impart strength for size, design, and application indicated.

C. Fabricate cabinets and door frames with reinforced corners, mitered to a hairline fit, with no exposed fasteners.

D. Fabricate shelf standards plumb and at heights to align shelf brackets for level shelves.

2.6 GENERAL FINISH REQUIREMENTS

A. Comply with NAAMM's "Metal Finishes Manual for Architectural and Metal Products" for recommendations for applying and designating finishes.

B. Protect mechanical finishes on exposed surfaces from damage by applying a strippable, temporary protective covering before shipping.

C. Appearance of Finished Work: Noticeable variations in same piece are unacceptable. Variations in appearance of adjoining components are acceptable if they are within the range of approved Samples and are assembled or installed to minimize contrast.

2.7 ALUMINUM FINISHES

A. Clear Anodic Finish: AAMA 611, AA-M12C22A31, Class II, 0.010 mm or thicker.

B. Color Anodic Finish: AAMA 611, AA-M12C22A32/A34, Class II, 0.010 mm or thicker.

C. Baked-Enamel or Powder-Coat Finish: AAMA 2603, except with a minimum dry film thickness of 1.5 mils (0.04 mm). Comply with coating manufacturer's written instructions for cleaning, conversion coating, and applying and baking finish.

PART 3 EXECUTION

3.1 PROJECT CONDITIONS

A. Environmental Limitations: Do not deliver or install display cases and bulletin boards for indoor installations until spaces are enclosed and weathertight, wet-work in spaces is complete and dry, work above ceilings is complete, and temporary HVAC system is operating and maintaining ambient temperature and humidity conditions at occupancy levels during the remainder of the construction period.

B. Field Measurements: Verify actual dimensions of openings for display cases and bulletin boards] by field measurements before fabrication.

3.2 EXAMINATION

A. Examine walls, with Installer present, for compliance with requirements for installation tolerances, surface conditions of wall, and other conditions affecting performance of the

Work.

B. Examine roughing-in for electrical power systems to verify actual locations of connections before installation of illuminated units.

C. Examine walls and partitions for proper backing for display cases.

D. Examine walls and partitions for suitable framing depth if recessed units will be installed.

E. Proceed with installation only after unsatisfactory conditions have been corrected.

3.3 PREPARATION

A. Prepare recesses for display cases as required by type and size of unit.

3.4 INSTALLATION

A. General: Install units in locations and at mounting heights indicated on Drawings, or if not indicated, at heights indicated below. Keep perimeter lines straight, level, and plumb. Provide grounds, clips, backing materials, adhesives, brackets, anchors, trim, and accessories necessary for complete installation.

B. Bulletin Boards: Attach units to wall surfaces with concealed clips, hangers, or grounds.

C. Recessed Display Cases: Attach units to wall framing with fasteners at not more than 16 inches (400 mm) o.c. Attach aluminum trim over edges of recessed display cases and conceal grounds and clips. Attach trim with fasteners at not more than 24 inches (600 mm) o.c.

D. Surface-Mounted Display Cases: Attach units to wall surfaces with concealed clips, hangers, or grounds fastened at not more than 16 inches (400 mm) o.c. Secure tops and bottoms of display cases to walls.

E. Floor-Mounted Display Cases: Attach display cases with bases legs to floor with concealed anchors.

F. Comply with requirements specified elsewhere for connecting illuminated bulletin boards and display cases.

G. Install display case shelving level and straight.

3.5 ADJUSTING AND CLEANING

A. Adjust doors to operate smoothly without warp or bind and so contact points meet accurately. Lubricate operating hardware as recommended by manufacturer.

B. Touch up factory-applied finishes to restore damaged areas.

END OF SECTION 10 12 00

SECTION 10 14 00 GRAPHICS AND SIGNAGE

PART 1 GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section includes requirements including but not limited to:
1. Room identification signs.
2. Restroom signs.
3. Misc. identification signs.
4. Informational signs (not identification signs).
5. Accessories necessary for a complete installation.
6. Mascot Logo.

B. Related Sections:
1. Section 06 10 00: Rough Carpentry.
2. Section 09 21 16: Gypsum Board Assemblies.

1.3 SUBMITTALS

A. Product Data: Technical data for each type of signage.

B. Shop Drawings:
1. Submit fabrication and installation details and attachments to other work:
   a. Show sign mounting heights, locations of supplementary supports to be provided by others, and accessories.
   b. Show message list, typestyles, graphic elements, including raised characters and Braille, and layout for each sign at least half size.
   c. Exterior applied signage on face of wall to include mounting brackets and support anchorage to fit condition.

C. Samples: Submit one sample of each specified sign type, full-sized.

1.4 QUALITY ASSURANCE

A. Field Inspections:
1. All new tactile signage must be field inspected after installation per CBC 11B-703.1.1.2.

B. Accessibility Requirements:
1. Raised characters shall comply with CBC Section 11B-302.2.
   a. Depth: It shall be 1/32-inch (0.8 mm) minimum above their background, shall be sans serif uppercase, and be duplicated in Braille.
   b. Height: It shall be 5/8-inch (15.9 mm) minimum and 2 inches (51 mm) maximum based on the height of the uppercase letter “I.” See CBC Section 11B-703.2.5.
   c. Finish and Contrast: Characters and their background shall have a non-glare finish. Character shall contrast with their background with either light characters on a dark background or dark characters on a light background. See CBC Section11B-703.5.1.

d. Proportions: It shall be selected from fonts where the width of the uppercase letter "O" is 60% minimum and 110% maximum of the height of the uppercase letter "I." Stroke thickness of the uppercase letter "I" shall be 15% maximum of the height of the character. See CBC Sections 11B-703.22.4 and 11B-703.2.8.
e. Character Spacing: Spacing between individual raised characters shall comply with CBC Section 11B-703.2.7 and 11B-703.2.8.
f. Format: Text shall be in a horizontal format. See CBC Section 11B-703.2.9.
g. Braille: It shall be contracted (Grade 2) and shall comply with CBC Sections 11B-703.3 and 11B-703.4. Braille dots shall have a domed or rounded shape and shall comply with CBC Table and Figure 11B-703.3.1.
h. Mounting Height: Tactile characters on signs shall be located 48 inches minimum to the baseline of the lowest Braille cells and 60 inches maximum to the baseline of the highest line of raised characters above the finish floor or ground surface. See CBC Section and Figure 11B-703.4.4.
i. Mounting Location:
    1) A tactile sign shall be located per CBC Section and Figure 11B-703.4.2 as follows:
        a) Alongside a single door at the latch side.
        b) On the inactive leaf at double doors with one active leaf.
        c) To the right of the right-hand door at double doors with two active leafs.
        d) On the nearest adjacent wall where there is no wall space at the latch side of a single door or at the right side of double doors with two active leafs.
        e) So that a clear floor space of 18 inches x 18 inches minimum, centered on the tactile characters, is provided beyond the arc of any door swing between the closed position and 45-degree open position.
j. Visual Characters: Shall comply with CBC Section 11B-703.5 and shall be 40 inches minimum above finish floor or ground.
k. Pictograms: Shall comply with CBC Section 11B-703.6.
l. Symbols of Accessibility: Shall comply with CBC Section 11B-703.7.
m. Variable Message Signs: Shall comply with CBC Section 11B-703.8.

PART 2 PRODUCTS

2.1 MATERIALS

A. Manufacturers:
    1. Subject to compliance with requirements, provide products by one of the following:
        a. Apco Signs
        b. ASI Modulex, Inc.
        c. Best Sign Systems, Inc.
        d. InPro Corporation (IPC).
        e. Mohawk Sign Systems.
        f. Nelson-Harkins Industries.
        g. Seton Identification Products.
        h. Stamprite Supersine; a division of Stamp Rite Inc.
        i. Vomar Products, Inc.

B. Aluminum Castings: ASTM B26/B26M, alloy and temper recommended by sign manufacturer for casting process used and for type of use and finish indicated. Refer to drawings for location.

C. Aluminum Sheet and Plate: ASTM B209, alloy and temper recommended by aluminum producer and finisher for type of use and finish indicated. Refer to drawings for location.

D. Aluminum Extrusions: ASTM B221, alloy and temper recommended by aluminum producer and finisher for type of use and finish indicated.

E. Acrylic Sheet: ASTM D4802, category standard with manufacturer for each sign, Type UVF (UV filtering).

F. Plastic Laminate Sheet: NEMA LD 3, general purpose HGS grade, 0.048-inch (1.2-mm) nominal thickness.

G. Vinyl Film: UV resistant vinyl film of nominal thickness indicated, with pressure sensitive, permanent adhesive on back; die cut to form characters or images indicated and suitable for exterior applications.

H. Paints and Coatings for Sheet Materials: Inks, dyes, and paints that are recommended by manufacturer for optimum adherence to surface and are UV and water resistant for colors and exposure indicated.

I. Accessories:
1. Fasteners and Anchors:
   a. As necessary for secure anchorage of signage, noncorrosive and compatible with each material joined, and complying with the following:
      1) Use concealed fasteners and anchors unless indicated to be exposed.
      2) Exposed Metal Fastener Components: Fabricated from same basic metal and finish of fastened metal unless otherwise indicated.
2. Sign Mounting Fasteners:
   a. Concealed Studs: Concealed (blind), threaded studs welded or brazed to back of sign material or screwed into back of sign assembly, unless otherwise indicated.
3. Adhesive: Recommended by sign manufacturer.
4. Two Face Tape: High bond, foam core tape, 0.045 inch (1.14 mm) thick, with adhesive on both sides.
5. Bituminous Paint: Cold applied asphalt emulsion complying with ASTM D1187.

2.2 SIGNAGE

A. Laminated Plastic Tactile Room, Restroom and Miscellaneous Identification Signs:
1. Sign with smooth, uniform surfaces; with message and characters having uniform faces, sharp corners, and precisely formed lines and profiles; and as follows:
   a. Laminated Sheet Sign:
      1) Photopolymer face sheet with raised graphics laminated over subsurface graphics to acrylic backing sheet to produce composite sheet:
         a) Color(s): Selected by Architect from manufacture's full range of standard colors.
   b. Sign Panel Perimeter:
      1) Finish edges smooth:
         a) Edge Condition: Beveled.
         b) Corner Condition in Elevation: Square.
   c. Mounting at Walls: Stainless steel vandal-proof pin-in-head torx screws Surface mounted to wall with concealed anchors.
   d. Mounting at Glazing: Clear silicone adhesive.
   e. Text and Typeface, Panel and Photo Polymer Signs:
      1) Accessible raised characters and Braille. Finish raised characters to contrast with background color, and finish Braille to match background color:
         a) Raised Characters: Refer to Drawings.
         b) California Contracted Grade 2 Braille: Refer to Drawings.
         c) Pictograms: Field height of minimum 6 inches; no characters or braille in pictogram field; nonglare, field contrast to pictogram, text descriptors

below pictogram field
d) Accessibility Symbols: Where used, symbols shall comply with CBC 11B-703.7.

B. Solid Plastic Tactile Room, Restroom and Miscellaneous Identification Signs:
1. 1/4-inch thick, Graphic Process Sand Carved with pre-drilled holes for mounting screws:
a. Sign Panel Perimeter:
1) Edge Condition: Square cut.
2) Corner Condition in Elevation: 3/8” radius.
b. Mounting at Walls: Stainless steel vandal-proof pin-in-head torx screws
c. Mounting at Glazing: Clear silicone adhesive
d. Text and Typeface:
1) Accessible raised characters and Braille. Finish raised characters to contrast with background color, and finish Braille to match background color:
a) Raised Characters: Refer to drawings
b) California Contracted Grade 2 Braille: Refer to drawings
c) Pictograms: Field height of minimum 6 inches; no characters or braille in pictogram field; nonglare, field contrast to pictogram, text descriptors below pictogram field
d) Accessibility Symbols: Where used, symbols shall comply with CBC 11B-703.7.
e. Color: As selected by Architect from manufacture’s full range of standard colors.
f. For exterior uses, fabricate signs from exterior grade materials with UV inhibitor.

C. Cast Characters:
1. Characters with uniform faces, sharp corners, and precisely formed lines and profiles:
a. Character Material: Cast aluminum.
b. Character Height: Indicated on Drawings.
c. Finishes:
1) Baked Enamel or Powder Coat Finish: Color to be selected by the Architect from manufacture’s full range of standard colors.
2) Overcoat: Baked on clear coating.
d. Mounting: Concealed studs.
e. Typeface: Selected by Architect.

D. Field Applied, Vinyl Character Sign:
1. Prespaced characters die cut from 3 mil to 3.5 mil (0.076 mm to 0.089 mm) thick, weather resistant vinyl film with release liner on the back and carrier film on the front for onsite alignment and application:
a. Manufacturers:
1) Subject to compliance with requirements, provide products by one of the following:
a) Allen Markings.
b) APCO Graphics, Inc.
c) Mohawk Sign Systems.
d) Seton Identification Products.
2) Size: Indicated on Drawings.
3) Substrate: Indicated on Drawings.

E. Exterior Directional Signage: 0.080 inch thick aluminum sheet sign of size indicated. Paint with reflectorized paint. Graphics and text to be as indicated. Mount sign to wall with four countersunk vandal resistant screws or on free standing 2-inch diameter standard weight galvanized steel pipe post as indicated. Signs shall be in conformance with CBC, California Building Code (CCR), Title 24, Part 2, Section 11B-216.9.2 and 11B-703.5.

F. Accessible Gate Signage: 0.080 inch thick aluminum sheet sign of size indicated. Paint with reflectorized paint. Graphics and text to be as indicated. Attach sign to adjacent fence with 12 gage wire ties at each corner. Mount sign at 5'-0" from grade to center of sign. Sign shall be in conformance with CBC, California Building Code (CCR), Title 24, Part 2, Section 11B-206.4.7 and 11B-404.1.1.

G. Traffic Signage:
1. Van Parking Stall: 12 inch x 18 inch 0.080 inch thick aluminum accessible sign in accordance with CBC, California Building Code, (CCR), Title 24, Part 2, Section 11B-502.6 and 11B-703.7.2.1 with separate 12 inch wide x 4 inch high sign with "Van-Accessible" wording and additional language below symbol of accessibility that states "Minimum Fine $250.00." Mount on 2 inch diameter standard weight galvanized steel pipe post. Auto Parking Stall: 12 inch x 18 inch 0.080 inch thick aluminum accessible sign in accordance with CBC, California Building Code, (CCR), Title 24, Part 2, Section 11B-502.6 and 11B-703.7.2.1 with additional language below symbol of accessibility that states "Minimum Fine $250.00." Mount on 2 inch diameter standard weight galvanized steel pipe post
2. Drive Approach: 18 inch x 24 inch 0.080 inch thick aluminum tow- away sign with local address and police phone number in accordance with CBC, California Building Code, (CCR), Title 24, Part 2, Section 11B-502.8.1. Mount on 2 inch diameter standard weight galvanized steel pipe post.
3. Passenger Loading Zone: 12 inch x 18 inch 0.080 inch thick aluminum sign as detailed on drawings. Mount on 2 inch diameter standard weight galvanized steel pipe post.

2.3 FABRICATION

A. Provide sign assemblies according to requirements indicated:
1. Preassemble signs and assemblies in the shop to greatest extent possible. Disassemble signs and assemblies as necessary for shipping and handling limitations. Clearly mark units for reassembly and installation; apply markings in locations concealed from view after final assembly.
2. Mill joints to a tight, hairline fit. Form assemblies and joints exposed to weather to resist water penetration and retention.
3. Comply with AWS for recommended practices in welding and brazing. Provide welds and brazes behind finished surfaces without distorting or discoloring exposed side. Clean exposed welded and brazed connections of flux, and dress exposed and contact surfaces.
4. Conceal connections if possible; otherwise, locate connections where they are inconspicuous.
5. Internally brace signs for stability and for securing fasteners.
6. Provide rebates, lugs, and brackets necessary to assemble components and to attach to existing work. Drill and tap for required fasteners. Use concealed fasteners where possible; use exposed fasteners that match sign finish.
7. Castings: Fabricate castings free of warp, cracks, blowholes, pits, scale, sand holes, and other defects that impair appearance or strength. Grind, wire brush, sandblast, and buff castings to remove seams, gate marks, casting flash, and other casting marks before finishing.

B. Brackets:
1. Fabricate brackets, fittings, and hardware for bracket mounted signs to suit sign construction and mounting conditions indicated. Modify brackets as necessary:
   a. Aluminum Brackets: Factory finish brackets with baked enamel or powder coat finish to match sign background color unless otherwise indicated.

2.4 FINISH REQUIREMENTS

A. Protect mechanical finishes on exposed surfaces from damage by applying a strippable, temporary protective covering before shipping.

B. Appearance of Finished Work: Noticeable variations in same piece are not acceptable. Variations in appearance of adjoining components are acceptable if they are within the range of approved Samples and are assembled or installed to minimize contrast.

C. Directional Finishes: Run grain with long dimension of each piece and perpendicular to long dimension of finished trim or border surface unless otherwise indicated.

D. Organic, Anodic, and Chemically Produced Finishes: Apply to formed metal after fabrication but before applying contrasting polished finishes on raised features unless otherwise indicated.

E. Aluminum Finishes:
   1. Clear Anodic Finish: AAMA 611, Class I, 0.018 mm or thicker.
   2. Baked Enamel or Powder Coat Finish: AAMA 2603 except with a minimum dry film thickness of 1.5 mils (0.04 mm). Comply with coating manufacturer's written instructions for cleaning, conversion coating, and applying and baking finish.

PART 3 EXECUTION

3.1 FIELD CONDITIONS

A. Field Measurements: Verify locations of anchorage devices and electrical service embedded in permanent construction by other installers by field measurements before fabrication and indicate measurements on Shop Drawings.

3.2 EXAMINATION

A. Examine substrates, areas, and conditions for compliance with requirements for installation tolerances and other conditions affecting performance of signage work. Verify sign support surfaces are within tolerances to accommodate signs without gaps or irregularities between backs of signs and support surfaces unless otherwise indicated.

B. Proceed with installation after correcting unsatisfactory conditions.

3.3 INSTALLATION

A. Install signs using mounting methods indicated and according to manufacturer's written instructions:
   1. Install signs level, plumb, true to line, and at locations and heights indicated, with sign surfaces free of distortion and other defects in appearance.
   2. Install signs so they do not protrude or obstruct according to the accessibility standard.
   3. Interior Wall Signs:
      a. Install signs on walls adjacent to latch side of door where applicable. Where not indicated or possible, such as double doors, install signs on nearest adjacent walls. Locate to allow approach within 3 inches (75 mm) of sign without encountering protruding objects or standing within swing of door:
         1) See drawings for the mounting height and location of each sign.
   4. Before installation, verify sign surfaces are clean and free of materials or debris that impair installation.
   5. Corrosion Protection: Coat concealed surfaces of exterior aluminum in contact with grout, concrete, masonry, wood, or dissimilar metals, with a heavy coat of bituminous paint.

B. Mounting Height:
   1. Tactile characters on signs shall be located 48 inches minimum to the baseline of the lowest Braille cells and 60 inches maximum to the baseline of the highest line of raised characters above the finish floor or ground surface, pursuant to CBC Section and Figure 11B-703.4.1.

C. Mounting Location:
   1. A tactile sign shall be located as follows, pursuant to CBC Section and Figure 11B-703.4.2:
      a. Alongside a single door at the latch side.
      b. On the inactive leaf at double doors with one active leaf.
      c. To the right of the right-hand door at double doors with two active leafs.
      d. On the nearest adjacent wall where there is no wall space at the latch side of a single door or at the right side of double doors with two active leafs.
      e. So that a clear floor space of 18 inches by 18 inches minimum, centered on the tactile characters, is provided beyond the arc of any door swing between the closed position and 45-degree open position.

D. Mounting Methods:
   1. Exposed Fastener: Install vandal-resistant fastener; set screw head flush with sign face.
   2. Concealed Studs:
      a. Using a template, drill holes in substrate aligning with studs on back of sign. Remove loose debris from hole and substrate surface:
         1) Masonry Substrates: Fill holes with adhesive. Leave recess space in hole for displaced adhesive. Place sign in position and push until flush to surface, embedding studs in holes. Temporarily support sign in position until adhesive fully sets.
         2) Thin or Hollow Surfaces: Place sign in position and flush to surface, install washers and nuts on studs projecting through opposite side of surface, and tighten.
   3. Brackets: Remove loose debris from substrate surface and install backbar or bracket supports in position so that signage is correctly located and aligned.
   4. Shim Plate Mounting: Provide 1/8 inch (3 mm) thick, concealed aluminum shim plates with predrilled and countersunk holes, at locations indicated, and where other direct mounting methods are impractical. Attach plate with fasteners and anchors suitable for secure attachment to substrate. Attach signs to plate using method specified above.

E. Visual Characters shall comply with CBC Section 11B-703.5 and shall be 40 inches minimum above finish floor or ground.

F. Field Applied, Vinyl Character Signs: Clean and dry substrate. Align sign characters in final position before removing release liner. Remove release liner in stages and apply and firmly press characters into final position. Press from the middle outward to obtain good bond without blisters or fishmouths. Remove carrier film without disturbing applied vinyl film.

G. Signs Mounted on Glass: Provide opaque sheet matching sign material and finish onto opposite side of glass to conceal back of sign.

3.4 ADJUSTING AND CLEANING

A. Remove and replace damaged or deformed signs and signs that do not comply with specified requirements. Replace signs with damaged or deteriorated finishes or components that cannot be successfully repaired by finish touchup or similar minor repair procedures.

B. Remove temporary protective coverings and strippable films as signs are installed.

C. On completion of installation, clean exposed surfaces of signs according to manufacturer's written instructions and touch up minor nicks and abrasions in finish. Maintain signs in a clean condition during construction and protect from damage until acceptance by Owner.

END OF SECTION 10 14 00

SECTION 10 26 13 CORNER GUARDS

PART 1 GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section Includes: Requirements including but not limited to:
   1. Corner guards.
   2. Accessories necessary for a complete installation.

1.3 SUBMITTALS

A. A. Product Data:
   1. Manufacturer's specifications and other data needed to prove compliance with specified requirements of each type corner guard specified.
   2. Manufacturer's installation requirements.
   3. Manufacturer's cleaning and maintenance instructions.

B. Shop Drawings: Show locations of each item and installation details. Provide elevations of non-standard conditions.

C. Samples:
   1. Color charts consisting of actual product pieces, demonstrating full range of available colors, for Architect’s color selection.
   2. 12 inch long piece in full size profiles of corner guard in color selected.

1.4 QUALITY ASSURANCE

A. Regulatory Requirements:
   1. Surface Burning Characteristics:
      a. Comply with ASTM E84 or UL 723; testing by a qualified testing agency. Identify products with appropriate markings of applicable testing agency:
         1) Flame Spread Index: 25 or less.
         2) Smoke Developed Index: 450 or less.
   2. Accessibility Requirements:
      a. Comply with applicable requirements:
         1) U.S. Architectural and Transportation Barriers Compliance Board Americans with Disabilities Act Accessibility Guidelines for Buildings and Facilities (ADAAG) 2010.
         2) ICC/ANSI A117.1 Accessible and Useable Building and Facilities.
         3) CBC, Section 11B Accessibility.

B. Source Limitations: Obtain wall and door protection products from single source from single manufacturer.

1.5 DELIVERY, STORAGE, AND HANDLING

A. Store corner guards in original undamaged packages and containers inside well-ventilated area protected from weather, moisture, soiling, extreme temperatures, and humidity.

1. Maintain room temperature within storage area at not less than 70 degrees F (21 degrees C) during the period vinyl materials are stored.
2. Keep vinyl materials out of direct sunlight.
3. Store wall protection components for a minimum of 72 hours, or until material attains a minimum room temperature of 70 degrees F (21 degrees C).
   a. Store corner guard covers in a vertical position.

1.6 WARRANTY

A. Warranty: Written warranty in which the manufacturer agrees to repair or replace components of wall protection units that fail in materials or workmanship within specified warranty period.
   1. Failures include, but are not limited to, the following:
      b. Structural failures including detachment of components from each other or from the substrates, delamination, and permanent deformation beyond normal use.
      c. Deterioration of metals, metal finishes, vinyls, and other materials beyond normal use.

B. Warranty Period: Five (5) years from date of Substantial Completion.

PART 2 PRODUCTS

2.1 MATERIALS

A. Aluminum: Continuous 6063-T6 aluminum retainer behind entire height of corner guard, minimum 0.060 inch thick.

B. Vinyl Materials: Chemical and stain resistant, high impact resistant vinyl with integral color throughout; extruded and sheet material as required, thickness as indicated.

C. Fasteners: Aluminum, nonmagnetic stainless steel, or other noncorrosive metal screws, bolts, and other fasteners compatible with items being fastened. Use security type fasteners where exposed to view.

D. Adhesive: Recommended by protection product manufacturer.

2.2 WALL PROTECTION

A. Basis of Design: 160 Series as manufactured by InPro Corporation (IPC). Other manufacturers are subject to compliance with requirements.
   1. Construction Specialties, Inc.; (800) 233-8493.
   2. JL Industries, Inc.; (800) 554-6077.
   3. Korogard Wall Protection Systems.; (855) 753-5474.
   4. Nystrom, Inc.; (800) 547-2635

B. High Impact, Vinyl Cover Corner Guards: Assembly consisting of snap on, vinyl cover that is flush with adjacent wall surface, installed over retainer; including mounting hardware; fabricated with 90 degree or 135 degree turn to match wall condition; full wall height.
   1. Cover: Extruded rigid vinyl, minimum 0.078 inch (2.0 mm) wall thickness.
      a. Profile: Nominal 2 inch (50 mm) long leg and 1/4 inch (6 mm) corner radius.
      b. Height: 8 feet (2.4 m).
      c. Color: Selected by Architect from manufacturer’s full range of colors.
   2. Continuous Retainer: Minimum 0.060 inch (1.5 mm) thick, one piece, extruded aluminum.
   3. Retainer Clips: Impact absorbing clips.

2.3 FABRICATION

A. Fabricate corner guards according to requirements indicated for design, performance, dimensions, and member sizes, including thicknesses of components.

B. Factory Assembly: Assemble components in factory to greatest extent possible to minimize field assembly. Disassemble only as necessary for shipping and handling.

C. Fabricate components with uniformly tight seams and joints and with exposed edges rolled. Provide surfaces free of wrinkles, chips, dents, uneven coloration, and other imperfections. Fabricate members and fittings to produce flush, smooth, and rigid hairline joints.

2.4 FINISHES

A. Protect finishes on exposed surfaces from damage by applying a strippable, temporary protective covering before shipping.

B. Appearance of Finished Work: Noticeable variations in same piece are not acceptable. Variations in appearance of adjoining components are acceptable if they are within the range of approved Samples and are assembled or installed to minimize contrast.

PART 3 EXECUTION

3.1 EXAMINATION

A. Examine substrates and wall areas for compliance with requirements for installation tolerances, fire rating, and other conditions affecting performance of the work.

B. Examine walls to which corner guards will be attached for blocking, grounds, and other solid backing that have been installed in the locations required for secure attachment of support fasteners.

C. Proceed with installation after correcting unsatisfactory conditions.

3.2 PREPARATION

A. Complete finishing operations, including painting, before installing wall protection.

B. Prior to installation, clean substrate to remove dust, debris, and loose particles.

3.3 INSTALLATION

A. Installation Quality: Install wall protection according to manufacturer's written instructions, level, plumb, and true to line without distortions. Do not use materials with chips, cracks, voids, stains, or other defects that might be visible in the finished Work.

B. Mounting Heights: Install wall protection in locations and at mounting heights indicated on Drawings.

C. Accessories: Provide splices, mounting hardware, anchors, trim, joint moldings, and other accessories required for a complete installation.
   1. Provide anchoring devices and suitable locations to withstand imposed loads.
   2. Where splices occur in horizontal runs of more than 20 feet (6.1 m), splice aluminum retainers and vinyl covers at different locations along the run, but no closer than 12 inches (305 mm) apart.

3. Adjust end and top caps as required to ensure tight seams.

3.4 CLEANING

A. Immediately after completion of installation, clean vinyl covers and accessories using a standard ammonia based household cleaning agent.

END OF SECTION 10 26 13

SECTION 10 28 13 TOILET ACCESSORIES

PART 1 GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section includes requirements including but not limited to:
   1. Public use washroom accessories.
   2. Public use shower room accessories.
   3. Private use bathroom accessories.
   4. Healthcare accessories.
   5. Warm air dryers.
   6. Childcare accessories.
   7. Underlavatory guards.
   8. Custodial accessories.
   9. Accessories necessary for a complete installation.

1.3 PERFORMANCE REQUIREMENTS

A. Sanitary Facility Elements:
   1. Elements of sanitary facilities shall be mounted at locations in compliance with CBC Sections 11B-602 through 11B-612.
   2. Grab bars in toilet facilities and bathing facilities shall comply with CBC Section 11B-609.
   3. Grab bars and any wall or other surfaces adjacent to grab bars shall be free of sharp or abrasive elements and shall have rounded edges. The space around the grab bars shall be as follows:
      a. 1 ½ inches between the grab bar and the wall.
      b. 1 ½ inches minimum between the grab bar and projecting objects below and at the ends.
      c. 12 inches minimum between the grab bar and projecting objects above.
   4. Grab Bars to meet DSA IR 16-12 – Grab Bar Design and Connections: CBC.
      a. Grab Bars shall be designed to resist a single concentrated load of 250 lbs. applied in any direction at any point o the grab bar such as to produce the maximum load effect.

1.4 SUBMITTALS

A. Product Data:
   1. Technical Data including construction details, material descriptions, dimensions of individual components and profiles, and finishes:
      a. Include anchoring and mounting requirements, including requirements for cutouts in other work and substrate preparation.
      b. Include electrical characteristics.

B. Samples:
   1. Full size, for each exposed product and for each finish specified:
      a. Approved full size Samples will be returned and may be used in the Work.

C. Product Schedule: Show types, quantities, sizes, and installation locations by room of each accessory required. Identify locations using room designations indicated.

D. Maintenance Data: Submit for inclusion in maintenance manuals.

1.5 QUALITY ASSURANCE

A. Accessibility Requirements:
   1. Comply with applicable requirements:
      a. Americans with Disabilities Act of 1990, as amended:
         1) ADA Title II Regulations & the 2010 ADA Standards for Accessible Design
      b. California Building Code (CCR Title 24, Part 2, as adopted and amended by DSA):
         1) CBC Chapter 11B, Access to Public Buildings, Public Accommodations, Commercial Buildings and Public Housing.

B. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.

C. Source Limitations: Obtain products from single source from single manufacturer.

1.6 WARRANTY

A. Written warranty signed by manufacturer in which manufacturer agrees to repair or replace mirrors that fail in materials or workmanship within specified warranty period:
   1. Failures include, but are not limited to, visible silver spoilage defects.
   2. Warranty Period: 15 years from date of Substantial Completion.

PART 2 PRODUCTS

2.1 MATERIALS

A. Manufacturers:
   1. Toilet accessories schedule is based on Bobrick Washroom Equipment. Subject to compliance with requirements, provide products by one of the following:
      a. Bobrick Washroom Equipment, Inc. Basis of Design.
      b. AJW Architectural Products.
      c. American Specialties, Inc.
      d. Bradley Corporation.
      e. Brey-Krause Manufacturing Co.
      f. GAMCO Specialty Accessories; a division of Bobrick.
      g. Tubular Specialties Manufacturing, Inc.

B. Stainless Steel: ASTM A666, Type 304, 0.031-inch (0.8-mm) minimum nominal thickness unless otherwise indicated.

C. Brass: ASTM B19, flat products; ASTM B16/B16M, rods, shapes, forgings, and flat products with finished edges; or ASTM B30, castings.

D. Steel Sheet: ASTM A1008/A1008M, Designation CS (cold rolled, commercial steel), 0.036-inch (0.9-mm) minimum nominal thickness.

E. Galvanized Steel Sheet: ASTM A653/A653M, with G60 (Z180) hot dip zinc coating.

F. Galvanized Steel Mounting Devices: ASTM A153/A153M, hot dip galvanized after fabrication.

G. Fasteners: Screws, bolts, and other devices of same material as accessory unit and tamper-and-theft resistant where exposed, and of galvanized steel where concealed.

H. Mirrors: ASTM C1503, Mirror Glazing Quality, clear glass mirrors, nominal 6.0 mm thick.

I. Electric Dryer:
   1. Product - Model RA5-974 by World Dryer:
      a. Material: Cover made of 1/4” thick cast iron with porcelain enamel finish.
      b. Motor shall be universal type, 1/10 HP at 7500 RPM. Dryers shall deliver 200 cubic feet per minute of air volume (7300 LFM).
      c. Timer shall be electromechanical cam-style with 25 AMP rated switch to operate dryer for 30 second period on push button units.
      d. Infrared sensor detects hands, initiates and terminates drying on automatic units.
      e. Recessed units are made with cast iron covers and use a 16-gauge steel wall mounting box.
      f. Hand dryers shall be listed under reexamination service of Underwriters Laboratories, Inc.

2.2 COMPONENTS

A. Underlavatory Guard:
   1. Insulating pipe covering for supply and drain piping assemblies that prevent direct contact with piping and/or burns from piping; allow service access without removing coverings:
      a. Product: Truebro LavShield Protective Lavatory Enclosure.
      b. Material and Finish: Antimicrobial, molded plastic, white.
      c. Provide at all lavatories.

2.3 FABRICATION

A. Fabricate units with tight seams and joints, and exposed edges rolled. Hang doors and access panels with full length, continuous hinges. Equip units for concealed anchorage and with corrosion-resistant backing plates.

B. Keys: Provide universal keys for internal access to accessories for servicing and resupplying. Provide minimum of six keys to Owner's representative.

PART 3 EXECUTION

3.1 COORDINATION

A. Coordinate accessory locations with other work to prevent interference with clearances required for access by people with disabilities, and for proper installation, adjustment, operation, cleaning, and servicing of accessories.

B. Deliver inserts and anchoring devices set into concrete or masonry as required to prevent delaying the Work.

3.2 INSTALLATION

A. Install accessories according to manufacturers' written instructions, using fasteners appropriate to substrate indicated and recommended by unit manufacturer. Install units level, plumb, and firmly anchored in locations and at heights indicated.

B. Grab Bars: Install to withstand a downward load of at least 250 lbf (1112 N), when tested

according to ASTM F446.

3.3 ADJUSTING AND CLEANING

A. Adjust accessories for unencumbered, smooth operation. Replace damaged or defective items. Remove temporary labels and protective coatings. Clean and polish exposed surfaces according to manufacturer's written recommendations.

PART 4 SCHEDULE

4.1 ACCESSORY SCHEDULE

A. TA-1 - Soap Dispensers:
   1. Mounting: Surface.
   2. Model No.: B-2111 (vertical)
   3. Locations: Refer to drawings.

B. TA-2 - Mirrors:
   1. Mounting: Surface.
   2. Model No.: B-290.
   3. Size: 24 inches by 36 inches (600 mm by 900 mm), unless shown otherwise.
   4. Locations: Refer to drawings.

C. TA-3 - Toilet Paper Dispensers
   1. Mounting: Recessed.
   2. Model No.: B-6977
   3. Locations: Refer to drawings.

D. TA-4 - Paper Towel Dispensers:
   1. Mounting: Surface (Less than 4” projection)
   2. Model No.: B-262.
   3. Locations: Refer to drawings.

E. TA-5 - Grab Bars: Typical Accessible Toilet Stalls:
   1. Size/Finish: 42” x 1-1/2 inch diameter satin stainless steel
   2. Clearance: 1-1/2 inch between rail and wall.
   3. Model No.: B-6806.
   4. Mounting: Attach with concealed mounting kit. Mount parallel to floor.
   5. Location: Accessible water closets and toilet stalls.

F. TA-7 - Toilet Paper Dispensers with Sanitary Napkin Disposal:
   1. Mounting: Semi-recessed (Less than 4” projection).
   2. Model No.: B-3094
   3. Location: Refer to drawings.

G. TA-8 - Mop and Broom Holder:
   1. Mounting: Surface.
   2. Model No.: B-239 x 34.
   3. Capacity: Four hooks, three mop holders.
   4. Locations: Refer to drawings.

H. TA-9 - Grab Bars: (At Accessible Shower):
   1. Mounting: Surface.
   2. Model: B-6861 modified (24 x 16).
   3. Locations: Refer to drawings.

I. TA-10 - Folding Benches: Adult Height:
   1. Mounting: Surface, reversible.
   2. Models: B-5181.
   3. Locations: Refer to drawings.

J. TA-11 – Clothes Hook:
   1. Mounting: Surface
   2. Model No.: B-6717.
   3. Locations: Refer to drawings.

K. TA-12 - Shower Curtains, Rods and Hooks:
   1. Rods: B-207 (36 inches or as indicated).
   2. Curtains: B-6047 to 72" (42 inches x 72 inches or as required). Inpro-Super Bio Stat
   3. Shower Hooks: B-204-1
   4. Mounting/Locations: Refer to drawings.

L. TA-14 - Paper Towel Dispenser/Trash Receptacle Combination:
   1. Mounting: Surface.
   2. Model No.: B-38034
   3. Locations: Refer to drawings.

M. TA-15 - Grab Bars: (At Typical Semi-ambulatory Toilet Stalls):
   1. Size/Finish: 42" x 1-1/2 inch diameter satin stainless steel
   2. Clearance: 1-1/2 inch between rail and wall.
   3. Model No.: B-6806-42.
   4. Mounting: Attach with concealed mounting kit. Mount parallel to floor.
   5. Location: Refer to drawings.

N. TA-17 - Trash Receptacle:
   1. Mounting: Recessed
   2. Model No.: B-43644.
   3. Locations: Refer to drawings.

O. TA-19 - Seat Cover Dispenser:
   1. Mounting: Surface.
   2. Model No.: B-221
   3. Location: All water closets and toilet stalls.

P. TA-21 – Surface Mounted Hand Sanitizer Dispenser:
   1. Mounting: Surface.
   2. Model No.: B-2012
   3. Locations: Refer to drawings.

END OF SECTION 10 28 13

SECTION 10 44 00 FIRE EXTINGUISHER AND CABINETS

PART 1 GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section includes:
1. Fire Extinguisher Cabinets.
2. Fire Extinguishers

B. Related Sections:
1. Section 06 10 00: Rough Carpentry.

1.3 SUBMITTALS

A. Product Data:
1. Manufacturer's specifications and technical data to indicate specification compliance.
2. Manufacturer’s installation instructions.

PART 2 PRODUCTS

2.1 MANUFACTURERS

A. Specifications are based on the products of named manufacturers. Other listed manufacturers who produce products equivalent to those specified are approved for use on the Project. Other manufacturers must have a minimum of five (5) years’ experience manufacturing equivalent to those specified and comply with Division 01 requirements regarding substitutions to be considered:
1. Larsen's Manufacturing Co.
2. The Williams Bros. Corporation of America.
3. J. L. Industries, Inc.
4. Potter-Roemer.

2.2 MATERIALS

A. Fire Extinguishers and Cabinets must comply with CBC Sections 11B-307, 11B-308, 11B-309, and 11B-403.

B. Fire Extinguisher Cabinets (FEC):
1. Size: 24 inches x 9-1/2 inches x 6 inches inside tub dimension.
2. Type: Semi-recessed with 2-1/2 inch return trim rolled edge; ADA compliant.
3. Tub Construction: 22 gauge min. steel with standard baked acrylic enamel interior finish.
4. Door and Frame: 18 gauge min. 304 stainless steel door and frame with vertical decal lettering "FIRE EXTINGUISHER" in red color, unless directed otherwise by Architect.
5. Glazing: clear acrylic “Duo” vertical glazing panel
6. Hardware: Continuous concealed piano hinge constructed of material which matches door and trim material. Satin finish pull handle with cam cylinder lock with safety pull designed to release upon firm pull on handle (Larsen’s “Larsen-Loc”™, J.L. Industries

"Saf-T-Lok"™; or equivalent).

7. Bracket: Hook type; Larsen's #1007, or equal.
8. Finish of Exterior: #4 Stainless steel.
9. Fire rating: as occurs, provide fire rated cabinet, for one or two hour rated conditions as indicated or required by specific location. Cabinet shall be tested and approved by Warnock Hersey to ASTM E814, and shall bear the Warnock Hersey label.

C. Fire Extinguishers (F.E):
1. Models/Types:
   a. Multipurpose dry chemical with 10 lbs. capacity: C rating conforming to MP10 Series. UL Rating: 4A:80B:C.
   b. Wet-Chemical Type, WC Series, (FE-K): UL-rated 2-A: K, 2.5-gal. (9.5-L) nominal capacity, with potassium carbonate-based chemical in stainless-steel container; with pressure-indicating gage.
2. Mounting: Provide eye brackets for direct wall mounting to hook and for mounting in Fire Extinguisher cabinets. Refer to drawings for location and quantity.
3. Provide initial inspection tag for each extinguisher.

PART 3 EXECUTION

3.1 INSTALLATION

A. Install fire extinguishers and cabinets in openings in accordance with manufacturer's printed instructions.

B. Install fire extinguishers and cabinets where indicated on the drawings, or if not indicated, in locations required by governing code and as directed by Owner.

END OF SECTION 10 44 00

SECTION 10 51 53 LOCKER ROOM BENCHES

PART 1 GENERAL

1.1 RELATED DOCUMENTS

A. A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section includes requirements including but not limited to:
   1. Wood Benches.
   2. Accessories necessary for a complete installation.

B. Related Sections:
   1. Section 03 30 00: Cast-In-Place Concrete.
   2. Section 05 50 00: Metal Fabrications.
   3. Section 09 90 00: Painting.

1.3 SUBMITTALS

A. Product Data:
   1. Manufacturer's schedules, charts, literature, and illustrations to indicate the performance, fabrication procedures, product variations, and accessories.
   2. Manufacturer's installation instructions.

B. Shop Drawings: Indicate size, material, and finish. Show location and installation procedures. Include details of joints, attachments and clearances.

1.4 QUALITY ASSURANCE

A. Regulatory Requirements:
   1. Accessibility Requirements - Comply with applicable requirements:
      a. U.S. Architectural and Transportation Barriers Compliance Board Americans with Disabilities Act Accessibility Guidelines for Buildings and Facilities (ADAAG) 2010.
      b. 2022 California Building Code.
         1) Section 11B-225.2.1.
         2) Section 11B-811.

B. Source Limitations - Obtain metal lockers and accessories from single source from single locker manufacturer:
   1. Obtain locks from single lock manufacturer.

C. Preinstallation Conference: Conduct conference at site.

1.5 WARRANTY

A. Warrant the work specified herein against defects in material and workmanship to the original purchaser for the life of the product.

B. Defects shall include, but not be limited to, the following:
   1. Rapid deterioration of finish.
   2. Loose or missing parts.

3. Non-functioning components and mechanisms.
4. Rust, delamination, warp, rot or breakage.

PART 2 PRODUCTS

2.1 MANUFACTURERS

A. Manufacturers are subject to compliance with requirements; provide products by one of the following:
1. ASI Storage Solutions, Inc.; (901) 312-6195.
2. DeBourgh Manufacturing Co.; (800) 328-8829.
3. List Industries, Inc.; (800) 776-1342.
4. Penco Products, Inc.; (800) 562-1000.
5. Republic Storage Systems Co., Inc.; (800) 477-1255.

2.2 LOCKER ROOM BENCHES

A. Benches:
1. Bench Material: Shall be laminated hardwood maple.
2. Size: Shall be 9-1/2 inches deep x 1-1/4-inch-thick x lengths as shown on drawings.
3. Finish: Manufacturer's two (2) coat clear acrylic finish.

B. Pedestals:
1. Manufacturer’s heavy-duty cast iron pedestal supports not more than 6 feet-0 inches o.c., with provisions for attaching pedestals to bottom of bench and anchoring pedestals to floor.
2. Height: 17-3/4 inches.
3. Finish: Manufacturer's baked enamel finish in selected color by Architect to match lockers, unless noted otherwise.

C. Anchorages: Provide screw fasteners for attaching each pedestal to bottom of bench and two (2) suitable anchors per pedestal for anchoring pedestals to floor.

PART 3 EXECUTION

3.1 INSTALLATION

A. Assemble and install locker room benches plumb, level, and flush in the locations shown on the drawings in accordance with the manufacturer’s instructions.

B. Install and anchor locker room benches to the floor and wall as instructed by the manufacturer.

END OF SECTION 10 51 53

SECTION 10 56 13 METAL STORAGE SHELVING

PART 1 GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section includes requirements including but not limited to:
   1. Four post metal storage shelving.
   2. Accessories necessary for a complete installation.

1.3 PERFORMANCE REQUIREMENTS

A. Delegated Design: Design metal storage shelving, including comprehensive engineering analysis by a qualified professional engineer, using performance requirements and design criteria indicated.

B. Seismic Performance - Metal storage shelving shall withstand the effects of earthquake motions determined according to ASCE/SEI 7:
   1. Seismic Component Importance Factor: 1.0.

1.4 SUBMITTALS

A. Product Data: Technical data for each type of shelving unit and accessory components including recessed tracks. Include rated capacities, installation and construction details, and material descriptions, dimensions of individual components and profiles, and finishes.

B. Shop Drawings: Submit plans, elevations, sections, and details, including installation details of connectors, lateral bracing, and special bracing.

C. Seismic Qualification Certificates: For metal storage shelving, accessories, and components, from manufacturer.

PART 2 PRODUCTS

2.1 MATERIALS

A. Hot Rolled Steel Sheet: ASTM A1011/A1011M, Commercial Steel (CS), Type B; free of scale, pitting, or surface defects; pickled and oiled.

B. Cold Rolled Steel Sheet: ASTM A1008/A1008M, Commercial Steel (CS), Type B.

C. Metallic Coated Steel Sheet: ASTM A653/A653M, Commercial Steel (CS), Type B; with G60 (Z180) zinc (galvanized) or A60 (ZF180) zinc-iron-alloy (galvannealed) coating.

D. Steel Tubing: ASTM A513, Type 2.

2.2 STORAGE SHELVING UNITS

A. Four Post Metal Storage Shelving:
   1. Manufacturers are subject to compliance with requirements; provide products by one of the following:
      a. AMCO Corporation.
      b. Dixie Shelving Co.
      c. Equipto.
      d. InterMetro Industries Corporation.
      e. Lyon Workspace Products, LLC.
      f. Montel, Inc.
      g. Penco Products, Inc.
      h. Republic Storage Systems Co.
      i. Safco Products.
      j. Tennsco.

B. Wire Type, Four Post Metal Storage Shelving - Complying with MH 28.1; field assembled from factory formed components. Shelves span between supporting corner posts that allow shelf height adjustment over full height of shelving unit. Provide fixed top and bottom shelves, adjustable intermediate shelves, and accessories indicated:
   1. Load Carrying Capacity per Shelf: Minimum 600 lb (272 kg), uniformly distributed.
   2. Posts - Fabricated from 1-inch (25 mm) OD, round tubing of indicated material; with grooves or notches at 1-inch (25 mm) o.c. to receive shelf to post connectors. Label posts with numbers at not less than 2 inches (51 mm) o.c. for determining shelf height:
      a. Post Material: Stainless steel.
      b. Post Base: Adjustable steel floor plate, drilled for floor anchors.
      c. Post Cap: Nylon or plastic.
      d. Unit Configuration: Configure shelving units as **individual, freestanding and add on unit** assemblies.
   3. Framed Type Wire Shelves: Metallic coated or stainless-steel wire over wire construction, with shelf frame fabricated from same material and with same finish as posts; with standard post collar, designed to engage collet (wedge), welded at each corner.
   4. Truss Type Wire Shelves: Steel or stainless-steel wire over wire construction, with downturned wire truss edges; with standard post collar, designed to engage collet (wedge), welded at each corner.
   5. Shelf Quantity: **Five** shelves per shelving unit in addition to top and bottom shelf.
   6. Shelf to Post Connectors: One-piece collet (wedge), designed to engage post collar attached to shelves.
   7. Bracing: Manufacturer's standard diagonal cross bracing, as required for stability, load-carrying capacity of shelves, and number of shelves.
   8. Overall Unit Width: 48 inches (1219 mm) inclusive of two end posts.
   9. Overall Unit Depth: 18 inches (457 mm).
   10. Overall Unit Height: 72 inches (1829 mm).
   11. Shelf Inlay: Clear plastic mat.
   12. Steel Finish: Except for stainless steel, baked enamel or powder coat.
   13. Color and Gloss: Selected by Architect.
   14. Stainless Steel Finish: Nondirectional polish finish.

2.3 ANCHORS

A. Floor Anchors: Galvanized steel, post installed expansion anchors or power actuated fasteners. Provide number per unit recommended by manufacturer unless additional anchors are indicated in calculations.

B. Wall Anchors: Galvanized steel anchors designed to secure metal storage shelving to adjacent wall. Provide one per shelving unit for each shelving unit adjacent to a wall unless additional anchors are indicated in calculations.

2.4 FABRICATION

A. Fabricate metal storage shelving components to provide field assembled units that are square and rigid, with posts plumb and true and shelves flat and free of dents or distortion. Fabricate connections to form a rigid structure, free of buckling and warping:
   1. Form exposed connections with hairline joints, flush and smooth, using concealed fasteners where possible. Locate joints where least conspicuous.
   2. Build in straps, plates, brackets, and other reinforcements as needed to support shelf loading.
   3. Cut, reinforce, drill, and tap metal fabrications to receive hardware, fasteners, and similar items.

B. Form metal in maximum lengths to minimize joints. Form bent metal corners to smallest radius possible without causing grain separation or otherwise impairing the work. Form backs of shelving units of up to 48 inches (1219 mm) wide from one piece.

C. Form edges and corners free of sharp edges or rough areas. Fold back and crimp exposed edges of unsupported sheet metal to form a hem on the concealed side; ease edges of metal plate to radius of approximately 1/32 inch (0.8 mm). Shear and punch metals cleanly and accurately. Remove burrs.

D. Weld corners and seams continuously to develop strength, minimize distortion, and maintain the corrosion resistance of base metals. At exposed locations, finish welds and surfaces smooth and blended so surface is smooth after finishing and contour of welded surface matches that of adjacent surface. Weld before finishing components to greatest extent possible. Remove weld spatter and welding oxides from exposed surfaces before finishing.

PART 3 EXECUTION

3.1 COORDINATION

A. Coordinate sizes and locations of blocking and backing required for installation of metal storage shelving attached to wall and ceiling assemblies.

B. Coordinate locations and installation of metal storage shelving that may interfere with ceiling systems including lighting, HVAC, speakers, sprinklers, access panels, electrical switches or outlets, and floor drains.

3.2 FIELD CONDITIONS

A. Environmental Limitations: Do not deliver or install metal storage shelving until spaces are enclosed and weathertight, wet work in spaces is complete and dry, and temporary HVAC system is operating and maintaining ambient temperature and humidity conditions at levels intended for building occupants during the remainder of the construction period.

3.3 EXAMINATION

A. Examine areas for compliance with requirements for installation tolerances and other conditions affecting performance of the work. Examine floors for suitable conditions where metal storage shelving will be installed.

B. Examine walls and ceilings to which metal storage shelving will be attached for properly located blocking, grounds, or other solid backing for attachment of support fasteners.

C. Proceed with installation after correcting unsatisfactory conditions.

3.4 PREPARATION

A. Vacuum and clean finished floor over which metal storage shelving is to be installed.

3.5 INSTALLATION

A. Install metal storage shelving level, plumb, square, rigid, true, and with shelves flat and free of dents or distortion. Make connections to form a rigid structure, free of buckling and warping:
   1. Install exposed connections with hairline joints, flush and smooth, using concealed fasteners where possible.
   2. Install braces, straps, plates, brackets, and other reinforcements as needed to support shelf loading and as required for stability.
   3. Adjust post base bolt leveler to achieve level and plumb installation.
   4. Anchor shelving units to floor with floor anchors through floor plate. Shim floor plate to achieve level and plumb installation.
   5. Install seismic restraints.
   6. Connect side to side and back to back shelving units together.
   7. Install shelves in each shelving unit at spacing indicated on Drawings:
      a. Four Post Metal Storage Shelving: Install four clips, one at each post, for support of each shelf; with clips fully engaged in post perforations.

3.6 ERECTION TOLERANCES

A. Erect four post metal storage shelving to a maximum tolerance from vertical of 1/2 inch (13 mm) in up to 10 feet (3 m) of height, not exceeding 1 inch (25 mm) for heights taller than 10 feet (3 m).

3.7 ADJUSTING

A. Adjust metal storage shelving so that connectors and other components engage accurately and securely.

B. Adjust and lubricate operable components to operate smoothly and easily, without binding or warping. Check and readjust operating hardware.

C. Touch up marred finishes or replace metal storage shelving that cannot be restored to factory-finished appearance. Use only materials and procedures recommended or furnished by metal storage shelving manufacturer.

D. Replace metal storage shelving components that have been damaged beyond successful repair by finish touchup or similar minor repair procedures

END OF SECTION 10 56 13

SECTION 10 75 16 GROUND SET FLAGPOLES

PART 1 GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section includes ground-set flagpoles made from aluminum.

B. Related Sections:
1. Section 03 30 00: Cast-In-Place Concrete.

C. Owner-Furnished Material:
1. Flags (United States and State of California).

1.3 SUBMITTALS

A. Product Data - For each type of product:
1. Include construction details, material descriptions, dimensions of individual components and profiles, operating characteristics, fittings, accessories, and finishes for flagpoles.

B. Shop Drawings - For flagpoles:
1. Include plans, elevations, and attachment details. Show general arrangement, jointing, fittings, accessories, grounding, anchoring, and support.
2. Include section, and details of foundation system.

C. Samples for Verification: For each type of exposed finish, in manufacturer's standard sizes.

D. Delegated-Design Submittal: For flagpoles.

E. Operation and Maintenance Data: For flagpoles to include in operation and maintenance manuals.

1.4 DELIVERY, STORAGE, AND HANDLING

A. Spiral wrap flagpoles with heavy paper and enclose in a hard fiber tube or other protective container.

PART 2 PRODUCTS

2.1 MANUFACTURERS

A. Source Limitations: Obtain flagpoles as complete units, including fittings, accessories, bases, and anchorage devices, from single source from single manufacturer.

2.2 PERFORMANCE REQUIREMENTS

A. Delegated Design: Engage a qualified professional engineer, as defined in Section 01 43

00: Quality Assurance, to design flagpole assemblies.

B. Seismic Performance: Flagpole assemblies shall withstand the effects of earthquake motions determined according to ASCE/SEI 7.

2.3 ALUMINUM FLAGPOLES

A. Aluminum Flagpoles - Entasis-tapered flagpoles fabricated from seamless extruded tubing complying with ASTM B241/B241M, Alloy 6063, with a minimum wall thickness of 3/16 inch (4.8 mm):
   1. Basis-of-Design Product - Subject to compliance with requirements, provide product indicated on Drawings, or comparable product by one of the following:
      a. Acme/Lingo Flagpoles LLC.
      b. American Flagpole; a Kearney-National Inc. company.
      c. Baartol Company.
      d. Concord Industries, Inc.
      e. Eder Flag Manufacturing Company, Inc.
      f. Ewing Flagpoles.
      g. Morgan-Francis Flagpoles and Accessories.
      h. Pole-Tech Company Inc.
      i. U.S. Flag & Flagpole Supply, LP.

B. Exposed Height: 25 feet (7.5 m).

C. Construct flagpoles in one piece if possible. If more than one piece is necessary, comply with the following:
   1. Fabricate shop and field joints without using fasteners, screw collars, or lead calking.
   2. Provide flush hairline joints using self-aligning, snug-fitting, internal sleeves.

D. Metal Foundation Tube - Manufacturer's standard corrugated-steel foundation tube, 0.060-inch (1.52-mm) wall thickness with 3/16-inch (4.8-mm) steel bottom plate and support plate; 3/4-inch- (19-mm-) diameter, steel ground spike; and steel centering wedges welded together. Galvanize foundation tube after assembly. Furnish loose hardwood wedges at top of foundation tube for plumbing pole:
   1. Flashing Collar: Same material and finish as flagpole.

E. Sleeve for Aluminum Flagpole - Fiberglass or PVC pipe foundation sleeve, made to fit flagpole, for casting into concrete foundation:
   1. Flashing Collar: Same material and finish as flagpole.

F. Cast-Metal Shoe Base - Made from aluminum with same finish and color as flagpole finish and color for anchor-bolt mounting; furnish with anchor bolts:
   1. Furnish ground spike.

2.4 MISCELLANEOUS MATERIALS

A. Nonshrink, Nonmetallic Grout: Factory-packaged, nonstaining, noncorrosive, nongaseous grout complying with ASTM C1107/C1107M.

B. Drainage Material: Crushed stone, or crushed or uncrushed gravel; coarse aggregate.

C. Sand: ASTM C33/C33M, fine aggregate.

D. Bituminous Paint: Cold-applied asphalt emulsion complying with ASTM D1187/D1187M.

2.5 ALUMINUM FINISHES

A. Natural Satin Finish: AA-M32, fine, directional, medium satin polish; buff complying with AA-M20; seal aluminum surfaces with clear, hard-coat wax.

B. Clear Anodic Finish: AAMA 611.

C. Color Anodic Finish: AAMA 611:
   1. Color: Match Architect's sample.
   2. Appearance of Finished Work: Noticeable variations in same piece are not acceptable. Variations in appearance of adjoining components are acceptable if they are within the range of approved Samples and are assembled or installed to minimize contrast.

PART 3 EXECUTION

3.1 PREPARATION

A. Prepare uncoated metal flagpoles that are set in foundation tubes by painting below-grade portions with a heavy coat of bituminous paint.

B. Foundation Excavation: Excavate to neat clean lines in undisturbed soil. Remove loose soil and foreign matter from excavation and moisten earth before placing concrete. Place and compact drainage material at excavation bottom.

C. Provide forms where required due to unstable soil conditions and for perimeter of flagpole base at grade. Secure and brace forms to prevent displacement during concreting.

D. Foundation Tube: Place foundation tube, center, and brace to prevent displacement during concreting. Place concrete. Plumb and level foundation tube and allow concrete to cure.

E. Sleeves: Locate and secure sleeves in forms by bracing to reinforcement and forms.

F. Anchor Bolts: Locate and secure anchor bolts in forms with templates and by tying to reinforcement.

G. Place concrete, as specified in Section 03 30 00: Cast-in-Place Concrete. Compact concrete in place by using vibrators. Moist-cure exposed concrete for no fewer than seven days or use nonstaining curing compound.

H. Trowel exposed concrete surfaces to a smooth, dense finish, free of trowel marks, and uniform in texture and appearance. Provide positive slope for water runoff to perimeter of concrete base.

3.2 FLAGPOLE INSTALLATION

A. General: Install flagpoles where indicated and according to Shop Drawings and manufacturer's written instructions.

B. Foundation Tube: Place flagpole in tube, seated on bottom plate between steel centering wedges, and install hardwood wedges to secure flagpole in place. Place and compact sand in foundation tube and remove hardwood wedges. Seal top of foundation tube with a 2-inch (50-mm) layer of elastomeric joint sealant and cover with flashing collar.

C. Baseplate: Cast anchor bolts in concrete foundation. Install baseplate on washers placed over leveling nuts on anchor bolts and adjust until flagpole is plumb. After flagpole is plumb,

tighten retaining nuts and fill space under baseplate solidly with nonshrink, nonmetallic grout. Finish exposed grout surfaces smooth and slope 45 degrees away from edges of baseplate.

END OF SECTION 10 75 16

SECTION 11 14 60 VEHICLE EXHAUST REMOVAL SYSTEM

PART 1 GENERAL

1.1 SCOPE

A. The bidder shall provide all labor, materials, and equipment necessary, to put in working operation a complete system to remove both diesel and automotive exhaust gases, and particulate of operating vehicles within the confines of specified fire station(s). All necessary controls, fan, ductwork, labor and all other equipment and materials specified shall be part of the bidders work.

B. All items of equipment and materials described in these specifications are to be furnished installed and placed into proper operating condition in accordance with good practice and manufacturer's written or published instructions.

C. All workmanship and materials shall be in accordance with applicable codes and regulations. I.e. SMACNA, BOCA, NEC, ASTM, UBC, UMC, NFPA, AMCA and IMC. Such codes and regulations are to be considered part of these specifications.

D. The bidder shall warranty all materials, equipment and workmanship for a period of one (1) year from the date of final acceptance of the completed job, against original defects of material and workmanship, improper or insufficient maintenance, excessive wear and deterioration. Repairs shall be made at the bidders expense.

E. Bidder shall install a complete automatic disconnect Diesel Exhaust Removal System, that addresses the problem of diesel fumes in the fire department station house that will not interfere with normal day-to-day operations. The system shall be a Plymovent VSRX Rail type system that has the following performance criteria.

1. The exhaust removal system must provide approximately 100% complete evacuation of all diesel fumes at the source from start up to exit of the apparatus from the fire station. The diesel exhaust removal system shall be capable of reaching to the undercarriage of the vehicle tailpipe located anywhere from 10 to 75 feet away from the exiting door. The system must be able to accommodate drive through and back in bays to meet all the needs of the fire department.
2. The system must not affect personnel boarding the apparatus. Hose loops shall not hang any lower then seven feet from the bay floor. The hose assembly shall not touch or drag on the bay floor.
3. The exhaust system shall not block doorways, exits, and aisles in the apparatus bay, which could endanger the welfare of fire personnel visitors.
4. To protect the apparatus electrical system from any possible damage, the system bid shall not incorporate any type of electromagnetic device that requires the apparatus to be utilized as and electrical ground for the systems operation.
5.
6. Due to the harmful effects of diesel exhaust, the system must be designed and capable of capturing approximately 100% of the exhaust gas and particulate even in the event of a complete power failure. The system shall not detach itself from the apparatus for any reason during a power failure other then normal exiting of the apparatus bay. No exception to this requirement will be allowed.
7. Connection of the system to the vehicle must be made from a standing position. No exception to this requirement will be allowed.
8. Manufacturer must be I.S.O. 9001 certified

1.2 **STANDARD PRODUCTS:** Equipment and materials provided for the system installation shall be a standard product of manufacturer's currently engaged in the manufacturing of automatic vehicle exhaust removal systems. Where the requirement calls for a packaged exhaust system to be provided, all items shall be the product of the manufacturer.

1.3 **QUALITY ASSURANCE:** All workmanship, manufacturing procedures, airflow design, and materials shall be performance guaranteed. If any findings or test studies reveal improper materials, defective components or inadequate performance as outlined in the performance/technical specifications, the bidder shall remove and replace the materials in question.

1.4 **EQUIPMENT WARRANTY:** The bidder shall guarantee all materials, equipment and workmanship for a period of one (1) year from the date of the final acceptance of the completed job against original defects of material and workmanship, or excessive wear or deterioration. Defects shall be made good at the bidders expense with no cost or obligation to the owner.

1.5 **PRODUCT DELIVERY, STORAGE, AND HANDLING:** The bidder shall be solely responsible for the delivery, storage, and handling of all products. Any equipment placed in storage shall be protected from weather, humidity, temperature variations, dirt, dust, or other contaminants.

1.6 **BIDDER QUALIFICATIONS:** bids will only be accepted from companies that have an established reputation in the field of manufacturing and installing diesel exhaust removal systems. The bidder must be established in the business of diesel exhaust removal systems for a minimum of no less than twenty (20) years. **Bidder shall show proof that their system has been field tested and proven by supplying a list of not less then 100 fire department references (seven within the state the municipality is going to bid) to include a phone number and contact name.** Bids will only be accepted from companies that have a local (within 100 miles of the job site) inventory of spare parts (a minimum of $10,000) and factory certified and trained service technicians to perform the required service maintenance and to ensure there is no interruption if field service due to a lack of certified parts locally.

Any company offering a bid including a manufacturer other than the one specified is required to have a written letter from the owner stating the substitute manufacturers product is considered an equal. This letter must be signed by the owner, and dated a minimum of 30 days prior to the bid date.

PART 2 PRODUCTS:

2.1 MANUFACTURER

A. **PlymoVent Corporation**/Plymovent Industrial Ventilation Systems or approved equal.

5 Corporate Dr.
Cranbury, New Jersey 08512
USA
Toll Free: (800) 644-0911
FAX: (609) 655-0569
WEB: info@plymoventusa.com

B. LOCAL CONTACT

Air Exchange, Inc.
495-A Edison Ct.
Fairfield, CA 94534
Contact Name: Chris Koss
Toll Free: (800) 300-2945

Email: info@airexchange.com
Email: ckoss@airexchange.com

C. Substitution: Under provisions of Division 01.

D. Any company offering a bid including a manufacturer other than the one specified is required to have a written letter from the owner stating the substitute manufacturers product is considered an equal. This letter must be signed by the owner, and dated a minimum of 30 days prior to the bid date.

E. Any company offering a bid including a manufacturer other than the one specified is required to have submitted that manufacturer's product submittals to the architect for approval 10 days prior to the bid date.

2.2 AIR MOVING DEVICES:

A. Centrifugal Fans:
The fan shall be a direct drive centrifugal type, high pressure, single width, single inlet as required or indicated. Impeller wheels shall be of a radial design for high static pressure performance. Impeller wheels shall be spark resistance and made of aluminum material to prevent static electricity build up. The impeller shall be dynamically and static balanced, and of the non-overloading type to provide maximum efficiency while achieving quiet, vibration-free operation.

The fan motor and assembly shall be mounted on a steel frame for durability in any type of weather conditions. The base shall have four (4) pre punched openings at bottom of fan base for field attachment to either an exterior wall or roof structure.

B. Fan motor and bearing:
All 1 to 10 horsepower motors shall be totally enclosed fan cooled (TEFC). The bearings shall be self-aligned; ball bearing type permanently sealed and lubricated. Fan shafts shall be steel and rotate in a non-sparking TEFLON seal to prevent hot gases coming in contact with the motor bearings. The exhaust discharge outlet shall be in compliance with ACGIH recommendations and EPA requirements (min. of 40 " above roofline). Air intakes, windows, cascade systems, prevailing currents, communication equipment and building aesthetics shall be considered in the final location of the fan. Silencers shall be provided when fan sound decibels exceed 64 Dba.

C. Performance:
The Fan Capacity shall be sized as such as to deliver the required CFM at each hose drop the vehicle engine exhaust (based on an airtight connection at tailpipe), lengths of ductworks, elbows, branches, shut down. wyes, etc. which accumulate the static pressure at the field inlet. The manufacturer's provided fan(s) shall be performance guaranteed.

D. Location:
The fan shall be located on the outside of the fire station as far away from any living quarters as possible so that firefighters would not be disturbed by the system activation.

2.3 ELECTRICAL CONTROLLERS

A. Controller type:
The controller shall be manufactured and delivered as an Operating System with one series controller manufactured by the bidder or An equal to the specifications to follow.

B. Electrical controllers:
The electrical controller offered shall be approved by Underwriters Laboratories (UL) as a complete electrical system for enclosed industrial control panels. **No exceptions.**

1. Electrical controllers shall be UL listed/approved and manufactured in accordance with Underwriters Laboratories standard UL-508 enclosed industrial control panels. Enclosures shall be NEMA 12 rated and UL listed as Type 12. The electrical enclosure shall be provided and mounted in an electrical enclosure to restrict access to internal components of controller by only authorized entry.

C. Electrical Contactors:
Contactors shall be Allen Bradley Industrial Electrical Contactors, provided with the appropriate adjustable overload relays to meet the proper full load amperage of motor that is outlined in these specifications. The contactor shall conform to the following standards: BS-5424, VDE0660, and be approved by UL Certification as an approved component.

D. Control Transformer:
Shall be UL listed industrial control circuit transformer with primary and secondary fuse blocks. Transformer shall be provided with multi-tap primary 208V through 480V, AC, and 24V through 120V secondary.

E. Electrical Timer:
Shall be solid state five- (5) minute adjustable timer. The operating logic shall complete this cycle. Input voltage shall be applied to the timer at all times. Upon closure of a normally open isolated start switch, the load energizes and remains energized as long as the switch is closed. When the start switch opens, the timing cycle shall start. At the end of the preset time delay, the load de-energizes and the timer is ready for a new timing cycle. Timer shall be a UL recognized component under file number E65038.

F. Engine Start Switch:
Shall be of an engine pressure sensing type, capable of recognizing the output pressure of any type of motor vehicle exhaust. The electrical contact shall be dry type or not to exceed 24V.

G. Electrical Wiring:
Shall be run in wire channel to allow for easier identification of wiring circuit and appearance. All wiring circuitry shall meet UL listed for proper bending radiuses and terminations.

H. Electrical Terminal Block:
Shall be 600 V, UL rated and recognized. It shall provide individual connection points for remote controls, power and motor connections.

I. Electrical Wiring Schematic:
Shall be provided with each electrical control box supplied. Wiring schematic shall show internal circuitry as well as all primary and secondary connections to the controller.

2.4 DUCTWORK SYSTEM:

A. Ductwork type and materials:
Shall be UMC class 2 or SMACNA class 11 product conveying. It must meet or exceed criteria for construction and performance as outlined in Round Industrial Duct Construction Standards, SMACNA. Materials of construction unless otherwise specified for all ductwork and fittings shall be a minimum G-90 galvanized sheet metal in accordance with ASTM-A525 and A527. Only when specified, type 304 stainless steel in accordance with ASTM A240 shall be provided.

B. Ductwork sizing and gauges:
All ductwork subject to positive or negative pressure shall be of round, spiral pipe construction, with the range of available sizes not to exceed 20 inches in diameter. Duct gauge shall depend on diameter and a minimum operating pressure of 8 inches water gauge. Acceptable gauge and reinforcement requirements shall be in accordance to the following. Inner duct diameter 4" - 13" dia. shall be 26gauge standard spiral pipe and 14" - 20" dia. shall be 24-gauge standard spiral pipe.

C. Ductwork Fittings:
All exhaust fittings shall be round and have a wall thickness 2 gauges (one even gauge number) heavier than the lightest allowable gauge of the downstream section of duct to which they are connected. Air duct branch entrances shall be fabricated fittings or fabricated duct/tap assemblies. Fittings shall be constructed so that air stream converge at angles no greater then 45 degree. All seams shall be spot welded and if necessary internally sealed to insure airtightness. Tapered body fittings shall be used manifold. No exceptions.

D. Ductwork Design Velocities:
Shall be a minimum of 3000 feet/minute transport velocity at 275 cubic feet/per minute volume in metal ductwork at riser clamp which is the standard for design.

E. External Ductwork:
Shall be sized for the exact inlet and outlet of the exhaust fan blower. If the fire station is exposed to unusual inclement weather, unusual levels of acid rain or is within 3 miles of salt water, stainless steel shall considered for all exterior duct work components. An exhaust rain cap shall be supplied and manufactured in accordance with EPA standard for free draft rain cap requirements. Included as an integral part of this rain cap shall be a back draft damper to provide protection from rain and other inclement weather or air.

F. Exhaust Penetrations:
To protect the fire departments best interest ductwork shall only penetrate exterior walls rather than a roof penetration. In all cases when making a wall penetration through masonry or concrete walls it shall be done by the use of a professional core-drilling machine. The core drilling shall be properly sized to reduce the diameter of the opening to the smallest possible size. Only after all possible avenues for wall penetration are exhausted, shall the roof penetration be accepted. The original roofing contractor shall perform the work if possible to insure any warranties on the existing roof are not voided. If the original roofing contractor can not be notified a licensed roofing contractor shall be used.

2.5 VEHICLE EXHAUST REMOVAL SYSTEM EQUIPMENT:

A. Scope of System Operation:
The vehicle exhaust removal system shall capture approximately 100 % of the exhaust emissions directly at the tailpipe of the vehicle and exhaust those emissions to a specified area safely outside the building. The operating controller shall be designed to complete this cycle. A pneumatic operated collection nozzle shall beconnected to the motor vehicle's exhaust tailpipe, when the vehicle is started bythe driver, the exhaust fan will automatically energize and vent the toxic gases directly to the outside of the building. This automatic feature shall be achieved by means of a pressure sensor located inside the exhaust ducting; this pressure sensor shall sense the engines output pressure upon the first stroke of the engine piston and energize the fan starter. The automatic controller shall use an adjustable timer to keep the contactors energized for a designated period of time. Should the operating vehicle not exit the station within the designated preset time period the manual run button on the OS-3 control panel must be engaged, this will keep the fan running while the vehicle is running and must be turned off manually via stop button on OS-3 control panel.

The pneumatic connection device shall stay connected to the vehicle tailpipe as it travels to the exit door in a pre-engineered rail system. The rail shall be securely attached to the building structure and supports a flexible hose assembly that moves with vehicle inside the station. As the vehicle nears the exit door, the pneumatic nozzle connection located at the tailpipe shall tension release automatically therefore releasing the nozzle from the tailpipe. This shall be accomplished by means of uncoupling valve, balancer and end stop strategically located on the track/rail. After the system releases the vehicle tailpipe at the door, it shall retract passively and smoothly into a convenient storage position. When the vehicle returns to the station, a system operator manually pulls the flexible hose assembly to the entrance door. The system operator holds the pneumatic connection device approximately 18” from the floor and at the door threshold. The system operator, without bending over, attaches the pneumatic connection device just inside the door threshold as the vehicle enters the station, at which time the exhaust fan motor energizes. The vehicle driver momentarily stops the vehicle when the tailpipe is just at the door threshold (a backup man will notify the driver when it is time to stop the vehicle).The system operator, standing straight up shall slide the connection device up against a flanged adapter attached to the vehicle tailpipe. The cycle is completed as the exhaust fan starts and vents the toxic gases with the magnetic connection nozzle firmly attached to the vehicle exhaust pipe. The vehicle then proceeds to its designated resting position.

B. VSRX Rail Material:

Model: VSRX. Shall be constructed of a one-piece continuous extruded aluminum rail in a minimum length of 19 feet (5.79 m). Construction Profile: Rectangular profile, rail height of 10 inches (254 mm) including the rubber seals, rail thickness of 0.20 inch (5 mm), width of 8-½ inches (216 mm) ID. Bottom Portion of Rail: Continuous slots to accept a rubber seal. Rubber Seals: Fitted into each side of the rail and shall join in the middle. Rail Material: Aircraft aluminum alloy Type AA-6063 (ASTM B209/B209M). Rail: Extruded as a one piece design unit to maximize the structural integrity of the rail and to minimize joints which may add to possible leakage of dangerous exhaust gases.

C. Support Legs:

Support legs shall be manufactured and provided by the supplier of the primary exhaust removal system. (Equipment Manufacturer). This is to ensure that the unit is installed as a complete system including the mounting hardware. Support legs are 2” x 2” aluminum cut to proper lengths during installation work. Adjustable mounting bracket kit consists of two brackets to be thru bolted to leg stock. Side bracket kit comes with clamp for leg stock and two side braces for lateral and longitude bracing. Approximately one support left every ten feet. The angle shall be completely adjustable to the leg support and mounted perpendicular and parallel to direction of the track. The typical support angle shall be 45 degrees from the center line of the factory provided support leg. The standard leg shall be capable of meeting a Seismic 4 requirement.

D. Hydraulic Brake System:

The brake shall be incorporated into the end cap of the suction rail profile. The hydraulic brake system must incorporate an adjustable hydraulic shock, capable of reducing the forward impact of 1 to 4 suction trolleys, which may be installed now or in the future to the exhaust rail system. The hydraulic shock shall be capable of reducing to a full stop the trolley or trolleys in less than 6”, without physical damage to either the rail profile or trolley that it is stopping. The hydraulic shock must come in contact with a rubber bumper that is provided on the trolley assembly. Metal to plastic or metal to metal contact is not acceptable.

E. Rail Splicing Joint:

The splice joint shall be formed aluminum extrusion equal to the internal diameter of the suction rail profile. The splice shall have a wall thickness of no less than .190” in thickness and a length of no less than 8” from end to end. The rail splicing shall be safely secured by

no less that 12- 3/8” bolts, nuts and lock washers. Each bolt shall pass through the exterior of the rail profile and splicing joint and be secured on the inside by a lock washer and nut. Self-tapping bolts or screws are not acceptable.

F. Middle Rail Duct Connection:
The rail duct connection shall be rectangular to a 6” diameter round transition fitting fabricated from 24 gauge galvanized steel.

G. Trolley Assembly:
Trolley Assembly shall be a gantry type trolley with sealed bearing loaded wheels designed to roll inside the internal rail profile flange. The trolley chasses shall be galvanized steel epoxy coated with a black finish. The chassis shall be fitted with a tapered cone. The cone shall be fitted with independent friction wheels, which shall minimize resistance between the cone and the rubber sealing lips. The exhaust cone transition shall be a tapered slot design, which shall fit inside the suction rail profile. The tapered slot shall be equal or exceed in area the diameter of exhaust ventilation hose, which it is attached to. The trolley assembly shall be equipped with rubber impact bumpers at both the front and rear of the trolley assembly. There shall be a system balancer assembly provided to aid in the delivery of the hose to the exit door. The balancer assembly shall be a self-adjusting weight spring tension balancer with a lifting capacity of no less than 31 lbs. The balancer shall have a minimum diameter steel cable of .080 and have a safety link connection. The system supplier shall manufacture both the balancer and the trolley assemblies for the purpose of conveying the flexible hose to the door exit for automatic release of the pneumatic collection nozzle. Only a stainless steel balancer cable will be accepted. **No exceptions.**

H. Regulator Assembly:
The regulator assembly shall be constructed of cast aluminum and refinished with black epoxy coating for durability. The regulator shall safely operate with an in-put pressure of 0 - 200 psi; the output pressure shall be preset at 15 psi. The regulator shall be attached to each trolley chassis to allow for independent adjustment of each pneumatic nozzle. The regulator shall also be provided with needle type adjustment gauge that is clearly marked with the proper operating range of system.

I. Uncoupling Valve Assembly:
Shall be provided to activate the release of the pneumatic nozzle connection located on vehicles exhaust pipe. The valve shall be a whisker type that shall provide a single direction action and affixed to a mounting bracket directly onto the trolley chassis. The valve shall be activated when the whisker switch comes in contact with a disconnect plate located on the side of the rail profile. The disconnect plate shall provide activation for the uncoupling valve switch mounted on the suction trolley chassis. The disconnect plate shall be capable of being mounted anywhere on the outside of the rail in a manner that slows for easy adjustment. No holes shall be drilled into the rail for the mounting of the disconnect plate. One disconnect plate shall be provided for each trolley that is provided, to allow for independent adjustment of exit speeds.

J. Upper Flexible Hose:
Hose shall be flexible exhaust hose manufactured for the sole purpose of venting high temperature exhaust gases, which are produced by internal combustion engines. The flexible hose shall be designed strictly for the harsh environment of rapid response and auto-release of a vehicle exhaust tailpipe. Hose shall range from 3” - 5” diameters with varying lengths depending on the system length required ranging from 20 - 43 feet without joining or splicing connections. Hose material shall be high temperature synthetic rubber impregnated into a high temperature laminated fabric with a minimum overlapping thickness of 2 7/16”. This construction of hose must be capable of operating at continuous temperatures of 400 degrees F and intermittent temperatures of 500 degrees F such as are experienced when pump checks are performed inside the station. Independent testing by a

recognized UL laboratory must accompany this bid as proof of performance claim. Wire Helix shall be bound and protected in laminations of hose winding. This shall be accomplished in a fashion, which eliminates any possibility of personnel coming in contact with an exposed hot metal helix. The hose shall further protect the internal wire helix from heat buildup and in turn add increased visibility to personnel. Wear strip shall be 9/16” wide and be provided as a safety yellow color. The bend radius of the high temperature hose shall be no lesser then 1.5 times the diameter of hose to insure that hot gases berestricted as they pass through the system.

K. Lower Hose Assembly:
Shall be a rigid 3”-5" diameter by 2 foot long section of yellow and black hose identical in appearance to the upper hose assembly. Lower hose shall support the pneumatic connection nozzle and chrome reducing elbow in a rigid fashion as to allow for the operator to place hose collection nozzle onto the tailpipe without bending over. Lower hose is the only section of hose which shall disconnect from the upper hose assembly and act as a safety disconnect in the unlikely event thenozzle gets entangled.

L. Safety Disconnect Coupling:
A coupling shall be incorporated in the design of the system enabling the lower two foot hose assembly to separate from the upper hose assembly thus reducing the possible chance of damage to system, in the unlikely event the exhaust connection nozzle assembly may become entangled. This device shall consist of two spun aluminum collars connected by an ergonomic round handle. The release tension of this device shall separate the two at no greater than 88 Lb. This is considered a safety requirement and any system bid must incorporate a safety disconnect. No Exceptions.

M. Collection Nozzle Assembly:
The nozzle shall provide an substantially air tight seal around exhaust tail pipe when connected thus allowing for 100% source capture. The seal shall not allow for escape of life threatening exhaust gases, which may be present during the following conditions. If vehicle’s engine is accelerated above normal idle resulting in an exhaust velocity greater than 5000 feet per minute or in the event that the output velocity or CFM of the exhaust exceeds the manufacturers normal capturevelocity or CFM of exhaust system. The Nozzle shall automatically adjust its internal orifice to accept any tail pipe ranging from one inch through six-inch diameter. The bidder of the nozzle shall offer, if required, both maximum diameter nozzles ranging from 4.75" diameter to 8.25" diameter. The nozzle pressure shall not exceed 15 psi. when connected to the vehicles tailpipe. Nozzle construction shall be high temperature synthetic rubber, vulcanized to a high temperature synthetic fabric. A NOMEX inner liner shall be provided for the primary temperature source at the tailpipe and also act as a friction barrier. The chrome-reducing elbow that connects to the connection nozzle shall be fabricated using continuous welded construction. This important feature eliminates the escape of any potentially lethal exhaust gases and must provide for a smooth air flow transition from connection nozzle into the high temperature flexible hose. The angle of transition shall be no less than or greater than 67 degrees from the center line of reducer. The chrome-reducer shall incorporate a primary expanded metal debris screen, which is permanently affixed by welded seams to the inside opening of exhaust fitting. Since this item is a point of safety for both personnel and the system itself, no exception will be tolerated for this point.

N. Hose Saddle:
A hose suspension saddle shall be a steel elbow specifically manufactured for the sole purpose of suspending high temperature flexible hose. The design of the saddle shall smoothly transition the direction of the hose during its travel along the track. Securing clamps shall be provided including a link fastener, for the purpose of mounting it to the balancer safety link.

O. Special Features:
The system must be designed to expand for future apparatus to a tandem vehicle arrangement (one vehicle behind the other) by adding to the proposed system. Systems that require replacement of the existing system or major components to meet a tandem vehicle arrangement shall not be accepted. Overall system design and performance shall be for both back in and drive-through configurations when applicable, this assures door to door coverage and collection of dangerous exhaust gases from the point of connection at the doorway.

P. Vehicle Tailpipe Modification:
The bidder shall supply a drawing for the precise modification procedure for thevehicles to attach to the exhaust removal system. The modification shall vent the exhaust gases at a 90-degree angle on the passenger side of vehicle. Tailpipe modifications requiring a 45-degree angle of exhaust venting shall not be acceptable, so to prevent exhaust blow back into station after the auto-release system disengages from the tailpipe. A flange shall be provided and installed by the bidder as a precisely located stopping point for the collection nozzle.

PART 3 TRAINING:

3.1 TRAINING:

The bidder or authorized approved personnel, shall provide training to fire department personnel in the daily use and maintenance of the vehicle exhaust removal system that has been installed and specified herein. The fire department shall be notified at least 2 days prior to the date scheduled for the training course. Training shall be for all personnel involved with the operation of the exhaust removal system to include all shifts required to man the particular facility. The training session, shall be performed in person by a recognized representative of the manufacturer of the exhaust removal system, in addition a trainingvideo shall be provided to the fire department.

END OF SECTION 11 14 60

SECTION 11 90 00 MISCELLANEOUS EQUIPMENT

1. PART 1 GENERAL

1.1 SECTION INCLUDES

A. Cushioned Rubber Flooring.

B. Gas Range.

C. Range Hood and Blower.

D. Microwave.

E. Dishwasher.

F. Refrigerator/Freezer.

G. Bicycle Rack.

H. Gear Grid Lockers.

I. Ceiling Fan.

J. Stainless Steel Corner Wall Guard.

K. Wall Mounted Garden Hose Reel.

L. Washer

M. Dryer

N. Television Mount

O. Shop Room Equipment

P. Turnout Dryer

Q. Undercounter Refrigerator

R. Coffee Maker

S. Exterior Drinking Fountain

T. Shower Curtain

U. Hook to Backboard

V. Slide Pole Landing Mat

W. Slide Pole

X. Extractor

Y. Site Bench

Z. Wood Slat Fence

AA. BBQ
BB. Floor Mat

CC. Map Board

DD. Epoxy on Slab

1.2 REFERENCES

A. 2010 Americans with Disabilities Act (ADA) Standards for Accessible Design.

B. CBC - California Building Code, (CCR) California Code of Regulations , Title 24, Part 2.

1.3 SUBMITTALS

A. Submit product data and manufacturer's installation instructions for each item under provisions of District's Division 01 Requirements.

1.4 REGULATORY REQUIREMENTS

A. Conform to CBC, California Building Code, (CCR), Title 24, Part 2 and the 2010 ADA Standards for Accessible Design for accessibility.

1.5 OPERATION AND MAINTENANCE DATA

A. Submit operation and maintenance data under provisions of District's Division 01 Requirements.

1.6 WARRANTY

A. Provide District with all warranty paperwork for all appliances.

2. PART 2 PRODUCTS

2.1 PRODUCTS

A. Cushioned Rubber Flooring (Exercise Room and elevator cab): https://commercial.tarkett.com/en_US/collection-C000399-triumph-multi-functional-and-sports-rubber-tile, Tarkett Triumph Rubber Tile - hammererd finish, SlideLock locking system, 3/8" thick 24"x24" with matching transition strip down to meet polished concrete slab at door threshold. Colors selected:

1. Fitness Room - LB9 Rainstorm.

2. Elevator Cab - KN2 Expedition.

3. At Fitness Room only, 18" high wall base to be Tarkett Replay sheet product, color selected is Solid Night (see interior elevations for wall locations).

B. Duel Fuel Range: Wolf Range Company, DF606DG, 60" dual fuel range, 6 burners and infrared dual griddle, complete with standard features. Full side panels and skirt. Accessories include: red knobs, front legs covers, filler trim, and stainless steel bezel.

C. Range Hood and Blower: Wolf Range Company, 27" deep Model PW602718, with 1200 cfm internal blower model 814423, full width stainless steel duct cover flush to ceiling and low profile roof jack.

D. Microwave: GE Model JES2251SJ, stainless steel. (Two required)

E. Dishwasher: GE Model GLDT696DSS, stainless steel finish. Two (2) required.

F. Refrigerator/Freezer: Samsung RF28HMEDBSR, stainless steel. (Three required)

G. Bicycle rack: Landscape Structures Inc, Loop rack @ design 5/-4" long, 2-3/8" outside diameter pipe, Tender Tuff coating, finish color Grey. (One required).

H. Gear Grid Lockers: Gear Grid, www.geargridcorp.com, 24" wide x 20" deep x72" height, Type A - Wall mounted (16 total), Type B -Free-Standing Tube Wall mounted (14 total). Each locker shall have name

plate, Three (3) hooks, top shelf, geardryer stainless steel jacket holder, gearhanger hanging rod, and Two (2) heavy duty hangers and door with padlock option. Color selected - Red Baron.

I. Ceiling Fan:

1. Y Lighting Rudolph Ceiling Fan by Minka Aire Fan, Product No. MAF613133 Coal finish with standard 12" downrod, available at www.ylighting.com , 3 blades, 52" diameter span, with control to sync and operate multiple fans within a single room (six required).

2. Provide Westinghouse Saf-T-Grid kit for attachment of ceiling fan to T-Bar ceiling grid.

J. Stainless Steel Corner Wall Guard: Korogard, Model GS10, stainless steel, 4' long with 1" corner legs with radius edges and top. (quantity of 21)

K. Wall Mounted Garden Hose Reel: Eley Hose Reel, Model 1041-100P. Standard capacity, perpendicular crank configuration with 100 feet poly hose (13 required). Provide Model 1043 at exterior location by the fire hydrant (1 required).

L. Washer: Whirlpool WFW95HEDW (two required).

M. Dryer: Whirlpool WED97HEDW, electric (two required).

N. Television Mount: Mounting Dream product; Wall mount MD2296 with full motion dual articulating arm (17 required). Ceiling mount XD1235 (one required).

O. Shop Room Equipment:

1. Workbench - Husky 8ft adjustable height solid wood top, model G9600-US1, https://www.homedepot.com/p/Husky-8-ft-Adjustable-Height-Solid-Wood-Top-Workbench-G9600-US1/207131346 (one required).

2. 12-Drawer Tool Chest - Husky 66 inch long tool chest mobile workbench, gloss black with hardwood top, model 76812A24, https://www.homedepot.com/p/Husky-66-in-W-12-Drawer-Deep-Tool-Chest-Mobile-Workbench-in-Gloss-Black-with-Hardwood-Top-76812A24/204398429 (one required).

3. 9-Drawer Tool Chest - Husky 46 inch long tool chest mobile woekbench, gloss black with hardwood top, model 763089, https://www.homedepot.com/p/Husky-46-in-W-x-18-1-in-D-9-Drawer-Tool-Chest-Mobile-Workbench-with-Solid-Wood-Top-7440946R/206839475 (one required).

4. Pegboard Panel - Grainger 32"H x 96"W steel pegboard panel with 1200 lb. load capacity, black, model 35-P-3296BK, https://www.grainger.com/product/WALL-CONTROL-Steel-Pegboard-Panel-with-14K274?cm_sp=Product_Details-_-Products_Based_on_Your_Search-_-IDPPLARECS&cm_vc=IDPPLARECS (one required).

P. Turnout Dryer: Alliance Unimac, model UTGC6EDG44, 208V - 50/60 Hz 3Ph, 35 amp breaker (one required).

Q. Undercounter Refrigerator: GE stainless steel compact refrigerator, model GCE06GSHSB (one required).

R. Coffee Maker: Katum Bunn CWTF15-1 (one required in Conference Room 115).

S. Exterior Drinking Fountain: Elkay bi-level pedestral with pet fountain, model LK4420DB Grey (one required).

T. Shower Curtain: Inpro Corporation, www.inprocorp.com, Clickeze Privacy System, product to be Shield by Panaz Antimicrobial Fabric, stainless steel rod and hook rings. Pattern to be selected from entire pattern range (five required for crew restroom shower and one at Decon shower).

U. Hook for Backboard: www.thelifeguardstore.com, spineboard mounting bracket SKU 10-994 (one required in apparatus bay).

V. Slide Pole Landing Mat: Tenderfoot rubber mat, Equine straight-edge recessed into depressed slab, 5' x 5' square, 3/4" thick, black color.

W. Slide Pole: McIntire Model 19, https://www.slidepole.com/model19.htm# single piece cold-drawn brass pole, 2-1/2" diameter with 5/32" wall thickness with polished cast bronze ceiling trim ring. Install per drawing detail 15/A10.6 and custom size landing mat (see item 2.1.V above) recessed flush with slab.

X. Extractor Washer: Washer is an existing equipment supplied by the owner, contractor shall uninstall unit with all accessory components at current station, store during construction activities and re-install at location indicated. Mount per product manufacturer recommendations.

Y. Site Bench: www.commercialsitefurnishings.com/product/multi-logo-diamond-bench-5ft - 5' Two-Color Diamond Pattern Custom Logo Bench, Bench Color Granite, Second Color Sandstone, logo and lettering details will be provided by Fire District. (one required).

Z. Wood Slat Fence: Accoya Product, https://www.accoya.com/ See drawings for profile, size, attachment details. Untreated finish for natural weathering. Submit product information, installation instructions and warranty information for review.

AA. BBQ: Genesis II S-435, https://www.homedepot.com/p/Weber-Genesis-II-S-435-4-Burner-Natural-Gas-Grill-in-Stainless-Steel-with-Built-In-Thermometer-and-Side-Burner-67006001/307575075?MERCH=REC-_-pipinstock-_-300172191-_-307575075-_-N (one required).

BB. Floor Mat: Mats by Eaglemat.com, total of 6 mats with type, location and quantity as follows:

1. Soft Floor Drainage Mat, 3.2' x 5.3'. Room 124 mat with drainage holes and rooms 107 and 119 without drainage holes.

2. Berber Supreme Entrance Mat, 3' x 5', charcoal with black edge color. one each at room 113 and 121.

3. Rubber Scraper Logo Mat, 6' x 6', gray, horizontal layout with Fire District supplied logo graphic. one at room 101.

CC. Map Board: US Markerboard, horizontal sliding unit, wall mounted 12' wide x 4'-6" tall. System includes fixed tack board back panel, 3 tracks with 1'- 4' wide panel per track. Outer front panel to be magnetic white board with marker tray and the 2 middle boards to be tack boards. Standard clear aluminum frame (one required in apparatus bay).

DD. Epoxy on Slab: At second floor slide pole room slab, provide red epoxy https://www.homedepot.com/p/Rust-Oleum-RockSolid-70-oz-Metallic-Cherry-Bomb-Garage-Floor-Kit-2-Pack-286896/205725416 with anti-slip grit additive https://www.amazon.com/Rust-Oleum-60111-Rocksolid-Antislip-Additive/dp/B015EENBHK.

3. Part 3 EXECUTION

3.1 INSTALLATION

A. Install equipment in accordance with manufacturer's printed instructions and as indicated on the drawings.

B. Furnish all necessary hardware, anchors, inserts, connections, and embedded items necessary for proper installation. Coordinate with work of other sections.

C. Supply all appliance and equipment warranty paperwork to owner for completion.

END OF SECTION

SECTION 12 24 13 - ROLLER WINDOW SHADES

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes
   1. Provide manually operated, sunscreen and blackout roller shades as applicable.
   2. Provide electrically operated, sunscreen and blackout roller shades as applicable. Work includes local, group and master control systems for shade operation with addressable, encoded, electronic drive units (EDU).

B. Related Requirements
   1. Section 09 51 00 “Acoustical Ceilings”: Coordination with acoustical ceiling systems for blocking, installation of shade pockets, closures and related accessories.
   2. Division 26 - Electrical: Electric service for EDUs, and EDU controls, internal communication, low voltage wiring and data transfer, and connection to the Internet and required.

1.2 SUBMITTALS

A. Bid Submittal, Information Required with Submittal of Bid: In order to evaluate proposals for integrated lighting or AV control and window shade systems, the Architect requires the following information be submitted prior to the award of the system.
   1. Bid proposal shall be accompanied with a document that notes all deviations from these specifications on a line-by-line basis.
   2. Bid shall confirm that roller shade EDU’s and all related controls shall be integrated into a compatible control system as specified herein.
   3. Bid shall include separate line items listing the control/interface components required for building automation systems and building management systems (BAS/BMS), daylighting, audiovisual, and/or central integration systems. Roller shade controls manufacturer shall list all components included in their bid and shall include a letter stating that they shall be financially responsible for any change orders and/or back charges required by the BAS/BMS, audiovisual, or lighting control systems contractors to interface with the motorized roller shade system.

B. Product Data: Manufacturer’s data sheets on each product to be used, including:
   1. Preparation instructions and recommendations.
   2. Styles, material descriptions, dimensions of individual components, profiles, features, finishes and operating instructions.
   3. Storage and handling requirements and recommendations.
   4. Mounting details and installation methods.
   5. Typical wiring diagrams including integration of EDU controllers with building management system, audiovisual and lighting control systems as applicable.

C. Shop Drawings: Plans, elevations, sections, product details, installation details, operational clearances, power and control wiring diagrams, and relationship to adjacent work.
   1. Prepare shop drawings in AutoCAD or Microstation format using base sheets provided electronically by the Architect.
   2. Prepare control, wiring diagrams based on, switching and operational requirements provided by the Architect in electronic format.
   3. Include one-line diagrams, wire counts, coverage patterns, and physical dimensions of each item.

D. Window Treatment Schedule: For all roller shades. Use same room designations as indicated on the Drawings and include opening sizes and key to typical mounting details.

E. Verification Samples: For each finish product specified, one complete set of shade components, unassembled, demonstrating compliance with specified requirements. Shade cloth samples and aluminum finish sample as selected. Mark face of material to indicate interior faces.

F. Maintenance Data: Methods for maintaining roller shades, precautions regarding cleaning materials and methods, instructions for operating hardware and controls.

G. Warranty: Provide manufacturer's warranty documents as specified in this Section.

1.3 QUALITY ASSURANCE

A. Manufacturer Qualifications: Obtain roller shades system through one source from a single manufacturer with a minimum of ten years experience and minimum of five projects of similar scope and size in manufacturing products comparable to those specified in this section. This includes but is not limited to all required extrusions, accessories, controls and fabricated roller shades or else all stated and published warranties may be void.

B. Installer Qualifications: Engage an installer, which shall assume responsibility for installation of all system components, with the following qualifications.
   1. Installer for roller shade system shall be trained and certified by the manufacturer with a minimum of ten years experience in installing products comparable to those specified in this section.

C. Fire-Test-Response Characteristics: Passes NFPA 701-99 small and large-scale vertical burn. Materials tested shall be identical to products proposed for use.

D. Electrical Components: NFPA Article 100 listed and labeled by either UL or ETL or other testing agency acceptable to authorities having jurisdiction, marked for intended use, and tested as a system. Individual testing of components will not be acceptable in lieu of system testing. Where applicable, system components shall be FCC compliant.

E. Work shall be [performed in accordance with all applicable requirement of the latest edition of all governing codes, rules and regulations including but not limited to the following minimum standards, whether statuary or not:
   1. 2022California Electric Code (CEC).
   2. 2022 California Building Code (CBC).
   3. 2022 California Fire Code (CFC).
   4. 2022 California Mechanical Code (CMC).

F. Shadecloth Anti-Microbial Characteristics: 'No Growth' per ASTM G 21 results for fungi ATCC9642, ATCC 9644, and ATCC9645.

G. PVC-Free Shadecloth: Comply with the following.
   1. Environmental Certification: Submit written certification from the manufacturer, including third party evaluation, recycling characteristics, and perpetual use certification as specified below. Initial submittals, which do not include the Environmental Certification, below will be rejected. Materials that are simply 'PVC free' without identifying their inputs shall not qualify as meeting the intent of this specification and shall be rejected.
   2. Third Party Evaluation: Provide documentation stating the shade cloth has undergone third party evaluation for all chemical inputs, down to a scale of 100 parts per million, that have

been evaluated for human and environmental safety. Identify any and all inputs, which are known to be carcinogenic, mutagenic, teratogenic, reproductively toxic, or endocrine disrupting. Also identify items that are toxic to aquatic systems, contain heavy metals, or organohalogens. The material shall contain no inputs that are known problems to human or environmental health per the above major criteria, except for an input that is required to meet local fire codes.

3. Recycling Characteristics: Provide documentation that the shade cloth can, and is part of a closed loop of perpetual use and not be required to be down cycled, incinerated or otherwise thrown away. Scrap material can be sent back to the mill for reprocessing and recycling into the same quality yarn and woven into new material, without down cycling. Certify that this process is currently underway and will be utilized for this project.
4. Perpetual Use Certification: Certify that at the end of the useful life of the shade cloth, that the material can be sent back to the manufacturer for recapture as part of a closed loop of perpetual use and that the material can and will be reconstituted into new yarn, for weaving into new shade cloth. Provide information on each shade band indicating that the shade band can be sent back to the manufacturer for this purpose.

H. Requirements for Electronic Hardware, Controls, and Switches:
1. Roller shade hardware, shade fabric, EDU, and all related controls shall be furnished and installed as a complete two-way communicating system and assembly.

I. Mock-Up: Provide a mock-up, if Architect requires, of one roller shade assembly for evaluation of mounting, appearance and accessories.
1. Locate mock-up in window designated by Architect.
2. Do not proceed with remaining work until, mock-up is accepted by Architect.

1.4 DELIVERY, STORAGE, AND HANDLING

A. Deliver components in factory-labeled packages, marked with manufacturer and product name, fire-test-response characteristics, and location of installation using same room designations indicated on Drawings and in the Window Treatment Schedule.

1.5 PROJECT CONDITIONS

A. Environmental Limitations: Install roller shades after finish work including painting is complete and ambient temperature and humidity conditions are maintained at the levels indicated for Project when occupied for its intended use.

B. Power and control wiring shall be complete and certified, fully operational with uninterrupted communication on the lines and minimal noise certified by a commissioning agent (engaged by others).
1. 485, ICON, Lonmark and Dry Contract Network: Noise on the line not to exceed shade manufacturer’s limits.

1.6 WARRANTY

A. Warranty: Provide manufacturer’s standard warranties, including the following:
1. Roller Shade Hardware, and Shadecloth: Manufacturer’s standard non-depreciating twenty-five year limited warranty.
   a. EcoVeil standard non-depreciating 10 year limited warranty.
2. Electronic Roller Shade EDU’s and EDU Control Systems: Manufacturer’s standard non-depreciating five-year warranty.
3. Roller Shade Installation: One year from date of Substantial Completion, not including scaffolding, lifts or other means to access to the work above 12 Feet AFF, which are the responsibility of others.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Specifications are based on products of manufacturers named as the Basis of Design. Manufacturers listed whose product meet or exceed the specifications are approved for use on the Project. Other manufacturers must have a minimum of five (5) years experience manufacturing products meeting or exceeding the specifications and comply with Division 01 requirements regarding substitutions to be considered.
   1. Draper, Inc., Spiceland, IN; (765) 987-7999
   2. MechoSystems, Long Island City, NY; (718) 729-2020 ext. 1901

2.2 BASIS OF DESIGN

A. Products by MechoSystems; Long Island City, NY

2.3 INTELLIGENT ENCODED ELECTRONIC DRIVE SYSTEM

A. Electronic Drive Unit (EDU):
   1. Intelligent Encoded EDU, and Control System: Tubular, asynchronous (non-synchronous) EDU's, with built-in reversible capacitor operating at 120 VAC/60 Hz, (230 VAC/50 Hz) single phase, temperature Class B, thermally protected, totally enclosed, maintenance free with line voltage power supply equipped with locking disconnect plug assembly furnished with each EDU.
   2. Quiet [42 – 46 db] (within 3 feet open air).
   3. Conceal EDU's inside shade roller tube.
   4. Maximum current draw for each shade EDU of 0.9 Amps at 120 VAC.
   5. Use EDU's rated at the same nominal speed for all shades in the same room.
   6. Use EDU's with minimum of 34 RPM, that shall not vary due to load / lift capacity.
   7. Total hanging weight of shade band shall not exceed 80 percent of the rated lifting capacity of the shade EDU and tube assembly.

B. EDU System: (software, two-way communication): Specifications and design are based on the Intelligent EDU Control System, WhisperShade®IQ® System) as manufactured by MechoSystems. Other systems may be acceptable providing all of the following performance capabilities are provided. EDU and control systems not in complete compliance with these performance criteria shall not be accepted as equal systems.
   1. EDU shall support two methods of control.
      a. Local Dry Contact Control Inputs:
         1) EDU shall be equipped with dry contact inputs to support moving the EDU/shade to the upper and lower limits.
         2) EDU shall be equipped with dry contact inputs to support moving the EDU/shade to local switch preset positions.
         3) Shall support configuring the EDU under protected sequences so that a typical user would not change the EDU's setup. At a minimum the configuration should include setting limits, setting custom presets and configuring key modes of operation.
      b. Network Control:
         1) EDU shall be equipped with a bi-directional network communication capability in order to support commanding the operation of large groups of shades over a common backbone. The network communication card shall be embedded into the tubular EDU assembly.
   2. Upper and lower stopping points (operating limits) of shade bands shall be programmed into EDU's using either a hand held removable program module / configurator or a local switch.

3. Alignment Positions: Each EDU shall support a minimum of 133 repeatable and precisely aligned shade positions (including limits and presets).
    a. All shades on the same switch circuit or with the same network group address with the same opening height shall align at each limit or preset (intermediate stopping position) when traveling from any position, up or down.
    b. Shades of differing heights shall have capability for custom, aligned intermediate stop positions when traveling from any position, up or down.
    c. Alignment of shades mechanically aligned on the same EDU shall not exceed +/- 0.125 inches (3.175 mm) when commanded to the same alignment position.
    d. Alignment of shades on adjacent EDU's shall not exceed +/- 0.25 inches (6.35 mm) when commanded to the same alignment position.
    e. Local Switch Presets: A minimum of 3 customizable preset positions shall be accessible over the local dry contact control inputs and over the network connection.
        1) Upon setting the limits for the shade EDU these preset positions shall automatically default to 25%, 50% and 57% of the shade travel.
        2) These positions shall be capable of being customized to any position between and including the upper and lower limits of the shade. A removable program module / configurator or local switch shall be capable of customizing the position of these presets.
    f. Network Presets: A minimum of 29 customizable preset positions (including the 3 local switch presets) shall be accessible via network commands.
        1) Upon setting the limits for the shade EDU these preset positions shall automatically default to the lower limit unless customized elsewhere.
        2) These positions shall be capable of being customized to any position between and including the upper and lower limits of the shade. A removable program module / configurator shall be capable of customizing the position of these presets.
4. Network Control:
    a. The system shall have the capability of two-way digital communication with the EDU's over a common backbone.
    b. Each EDU shall possess 8 addresses capable of being employed for various levels of group control. These addresses shall be configurable via a handheld configurator and/or a PC controller. A 9th unique address shall enable the EDU(s) to be independently controlled and configured over the network via a handheld configurator and/or a PC controller.
    c. Low Voltage Communication Network Implementation.
        1) The low voltage network shall employ a bus topology with daisy chained network connections between nodes over a CAT5 cable (4 UTP) or over a 2 UTP cable employing at least 1 pair at 16 AWG for power and 1 pair at 22 AWG for data.
        2) The low voltage network (+/-13 VDC) shall be powered by the nodes attached to it. These nodes could be line voltage powered EDU's attached to 120 VAC or 230 VAC. Alternatively, low voltage nodes shall be powered typically by a centralized low voltage power supply. If a CAT5 network cable is employed and the node draws less than 1W then the node may be powered by DC power supplied by an associated line voltage EDU.
        3) Network Capacity: 4000 ft max, 250 nodes max
            a) The number and size of a centralized DC supply shall vary depending upon the network requirements.
5. Operating Modes:
    a. Uniform or Normal Modes of Operation:
        1) Uniform mode shall allow for shades to only move to defined intermediate stop positions to maintain maximum uniformity and organization.
        2) Normal Mode shall allow for shades to move to both intermediate stop positions, plus any position desired between the upper and lower limits as set by the installer.

6. Wall Switches:
   a. Conference Center: Shades shall be operated by, 5, 7, or 10-button low voltage standard switches, or programmable intelligent switches (IS). Standard switch shall be wired to a bus interface and the bus interface will be programmed to transmit an address for the local switch.
   b. Intelligent switches may be installed anywhere on the bus line. Each IS shall be capable of storing one control level address to be broadcast along the bus line.
   c. An address that is transmitted by either a switch or central controller shall be responded to by those EDU's with the same address in their control table.
   d. IS shall provide for interface with other low voltage input devices via a set of dry contact terminals located on the switch.
   e. Standard switch or IS may control an individual, sub-group or group of EDU's in accordance with the address in each EDU.

2.4 SHADE BANDS

A. Shade Bands: Construction of shade band includes the fabric, the enclosed hem weight, shade roller tube, and the attachment of the shade band to the roller tube. Sewn hems and open hem pockets are not acceptable.
   1. Concealed Hembar: Shall be continuous extruded aluminum for entire width of shade band and with the following characteristics:
      a. Hembar shall be heat sealed on all sides.
      b. Open ends shall not be accepted.
   2. Shade Band and Shade Roller Attachment:
      a. Use extruded aluminum shade roller tube of a diameter and wall thickness required to support shade fabric without excessive deflection.
      b. Provide for positive mechanical attachment of shade band to roller tube; shade band shall be made removable / replaceable with a "snap-on" snap-off" spline mounting, without having to remove shade roller from shade brackets.
      c. Mounting Spline shall not require use of adhesives, adhesive tapes, staples, and/or rivets.
      d. Any method of attaching shade band to roller tube that requires the use of: adhesive, adhesive tapes, staples, and/or rivets, does not meet the performance requirements of this specification and shall not be accepted.

2.5 ROLLER SHADE FABRICATION

A. Fabricate shade cloth to hang flat without buckling or distortion. Fabricate with heat-sealed trimmed edges to hang straight without curling or raveling. Fabricate unguided shadecloth to roll true and straight without shifting sideways more than 1/8 inch (3.18 mm) in either direction per 8 feet (2438 mm) of shade height due to warp distortion or weave design.

B. Provide battens in standard shades as required to assure proper tracking and uniform rolling of the shade bands. Contractor shall be responsible for assuring the width-to-height (W:H) ratios shall not exceed manufacturer's standards or, in absence of such standards, shall be responsible for establishing appropriate standards to assure proper tracking and rolling of the shadecloth within specified standards. Battens shall be roll-formed stainless steel or tempered steel, as required.

C. For railroaded shade bands, provide seams in railroaded multi-width shade bands as required to meet size requirements and in accordance with seam alignment as acceptable to Architect. Seams shall be properly located. Furnish battens in place of plain seams when the width, height, or weight of the shade exceeds manufacturer's standards. In absence of such standards, assure proper use of seams or battens as required to, and assure the proper tracking of the railroaded multi-width shade bands

D. Provide battens for railroaded shades when width-to-height (W:H) ratios meet or exceed manufacturer's standards. In absence of manufacturer's standards, be responsible for proper use and placement of battens to assure proper tracking and roll of shade bands.

E. Blackout shade bands, when used in side channels, shall have horizontally mounted, roll-formed stainless steel or tempered-steel battens not more than 3 feet (115 mm) on center extending fully into the side channels. Battens shall be concealed in an integrally colored fabric to match the inside and outside colors of the shade band, in accordance with manufacturer's published standards for spacing and requirements.
   1. Battens shall be roll formed of stainless steel or tempered steel and concave to match the contour of the roller tube.

2.6 ROLLER SHADE COMPONENTS

A. Access and Material Requirements:
   1. Provide shade hardware allowing for the removal of shade roller tube from brackets without removing hardware from opening and without requiring end or center supports to be removed.
   2. Provide shade hardware that allows for removal and re-mounting of the shade bands without having to remove the shade tube, drive or operating support brackets.
   3. Use only Delran engineered plastics by DuPont for all plastic components of shade hardware. Styrene based plastics, and /or polyester, or reinforced polyester shall not be accepted.

B. Motorized Shade Hardware and Shade Brackets:
   1. Provide shade hardware constructed of minimum 1/8 inch (3.18 mm) thick plated steel, or heavier, thicker, as required to support 150 percent of the full weight of each shade. Plastic components without use of steel angle construction do not meet the intent of this specification and shall not be accepted.
   2. Provide shade hardware system that allows for field adjustment of EDU or replacement of any operable hardware component without requiring removal of brackets, regardless of mounting position (inside, or outside mount).
   3. Provide shade hardware system that allows for operation of multiple shade bands offset by a maximum of 8-45 degrees from the EDU axis between shade bands (4-22.5 degrees) on each side of the radial line, by a single shade EDU (multi-banded shade, subject to manufacturer's design criteria).
   4. All bands within a single EDU group shall be aligned within 1/4 inch (6 mm).

C. Manual Operated Chain Drive Hardware and Brackets:
   1. Provide for universal, regular and offset drive capacity, allowing drive chain to fall at front, rear or non-offset for all shade drive end brackets. Universal offset shall be adjustable for future change.
   2. Provide hardware capable for installation of a removable fascia, for both regular and/or reverse roll, which shall be installed without exposed fastening devices of any kind.
   3. Provide shade hardware system that allows for removable regular and/or reverse roll fascias to be mounted continuously across two or more shade bands without requiring exposed fasteners of any kind.
   4. Provide shade hardware system that allows for operation of multiple shade bands (multi-banded shades) by a single chain operator, subject to manufacturer's design criteria. Connectors shall be offset to assure alignment from the first to the last shade band.
   5. Provide shade hardware system that allows multi-banded manually operated shades to be capable of smooth operation when the axis is offset a maximum of 6 degrees on each side of the plane perpendicular to the radial line of the curve, for a 12 degrees total offset.
   6. Provide positive mechanical engagement of drive mechanism to shade roller tube. Friction fit connectors for drive mechanism connection to shade roller tube are not acceptable.

7. Provide shade hardware constructed of minimum 1/8 inch (3.18 mm) thick plated steel or heavier as required to support 150 percent of the full weight of each shade.
8. Drive Bracket / Brake Assembly:
    a. MechoShade Drive Bracket model M5 shall be fully integrated with all MechoShade accessories, including, but not limited to: SnapLoc fascia, room darkening side / sill channels, center supports and connectors for multi-banded shades.
    b. M5 drive sprocket and brake assembly shall rotate and be supported on a welded 3/8 inch (9.525 mm) steel pin.
    c. The brake shall be an over running clutch design which disengages to 90 percent during the raising and lowering of a shade. The brake shall withstand a pull force of 50 lbs. (22 kg) in the stopped position.
    d. The braking mechanism shall be applied to an oil-impregnated hub on to which the brake system is mounted. The oil impregnated hub design includes an articulated brake assembly, which assures a smooth, non-jerky operation in raising and lowering the shades. The assembly shall be permanently lubricated. Products that require externally applied lubrication and or not permanently lubricated are not acceptable.
    e. The entire M5 assembly shall be fully mounted on the steel support bracket, and fully independent of the shade tube assembly, which may be removed and reinstalled without effecting the roller shade limit adjustments.
9. Drive Chain: #10 qualified stainless steel chain rated to 90 lb. (41 kg) minimum breaking strength. Nickel plate chain shall not be accepted.

2.7 ROLLER SHADE SCHEDULE

A. Roller Shade Schedule: Refer to the Drawings for locations.
1. Shade Type WS-1: Manual operating, chain drive, sunscreen roller shades in all exterior windows of rooms and spaces shown on the Drawings.
    a. Basis of Design: “Mechoshade WT-1” as manufactured by Mechosystems.
    b. Shade pockets
    c. Fascias
2. Shade Type WS-2: Manual, independently operating interior, chain drive "double" solar and room darkening blackout roller shades, in all exterior windows of rooms and spaces shown on Drawings, and related mounting systems and accessories.
    a. Basis of Design: “Mechoshade WT-3” as manufactured by Mechosystems.
    b. Shade pockets
    c. Fascias
    d. Room darkening side and sill channels (blackout shades only).
3. Shade Type WS-3: Motorized interior sunscreen roller shades in all exterior / interior windows of rooms and spaces as shown on referenced Drawings, and related EDU control requirements systems. Include the following as scheduled and as indicated on the Drawings:
    a. Basis of Design: “Mechoshade WT-4” as manufactured by Mechosystems.
    b. Shade pockets
    c. Fascias
4. Shade Type WS-6: Motorized interior, independently operated, solar and blackout double shades in all exterior windows of rooms and spaces shown on Drawings, and related EDU control systems. Shades shall have capability of being controlled by AV and, or lighting control system.
    a. Basis of Design: “Mechoshade WT-6” as manufactured by Mechosystems.
    b. Shade pockets
    c. Fascias
    d. Room darkening side and sill channels.

2.8 SHADECLOTH

A. Visually Transparent Single-Fabric Shadecloth: MechoSystems, ThermoVeil® group, single thickness, opaque non-raveling 0.030 inch (0.762 mm) thick vinyl fabric, woven from 0.018 inch (0.457 mm) diameter extruded vinyl yarn comprising of 25 percent polyester and 75 percent reinforced vinyl, in colors selected from manufacturer's available range.
   1. Dense Basket Weave: "1500 series", 3 percent open, 2 by 2 dense basket-weave pattern.
   2. Color: Selected from manufacturer's standard colors.

B. Room Darkening (PVC Free) Shadecloth with Opaque Acrylic Backing: MechoSystems, "Equinox 0100 series", .008 inches thick (.19 mm) blackout material and weighing .94 lbs. per square yard, comprising of 53% fiberglass, 45% acrylic, 2% poly finish.
   1. Color: Selected from manufacturer's standard colors.

C. Room Darkening (PVC Free) Blackout with Opaque Acrylic Backing: MechoSystems, "Midnite 0200 series", .008 inches thick (.19 mm) blackout material and weighing .94 lbs. per square yard, comprising of 73% acrylic (coating), 27% polyester (yarn).
   1. Color: Selected from manufacturer's standard colors.

D. Environmentally Certified Shadecloth: MechoSystems, EcoVeil group, 1350 or 1550 Series, fabricated from TPO for both core yarn and jacket, single thickness, 0.018 opaque coated reinforced yarn, non-raveling 0.030 inch (0.762 mm) thick fabric.
   1. Basket Weave: 5 percent open 2x2 basket weave
   2. Dense Basket Weave: 3 percent open 2x2 basket weave
   3. Color: Selected from manufacturer's standard colors.
   4. Warranty: 10-Year Limited.

2.9 ROLLER SHADE ACCESSORIES

A. Shade Pocket: For recessed mounting in acoustical tile or drywall ceilings as indicated on the drawings.
   1. Either extruded aluminum and or formed steel shade pocket, sized to accommodate roller shades, with exposed extruded aluminum closure mount, tile support and removable closure panel to provide access to shades.
   2. Provide "Vented Pocket" such that there will be a minimum of four 1 inch diameter holes per foot allowing the solar gain to flow above the ceiling line.

B. Fascia:
   1. Continuous removable extruded aluminum fascia that attaches to shade mounting brackets without the use of adhesives, magnetic strips, or exposed fasteners.
   2. Fascia shall be able to be installed across two or more shade bands in one piece.
   3. Fascia shall fully conceal brackets, shade roller and fabric on the tube.
   4. Provide bracket / fascia end caps where mounting conditions expose outside of roller shade brackets.

C. Room Darkening Side and Sill Channels:
   1. Extruded aluminum with polybond edge seals and SnapLoc-mounting brackets and with concealed fastening. Exposed fasting is not acceptable. Channels shall accept one-piece exposed blackout hembar with vinyl seal to assure side light control and sill light control.
      a. MechoSystems side channels, 1-15/16 inches (49.2 mm) wide by 1-3/16 inches (30.1 mm) deep, two-band center channels, 2-5/8 inches (66.6 mm) wide by 1-3/16 inches (30.1 mm) deep. The 2-5/8-inch (66.6 mm) double-center channels may be installed at center-support positions of multi-band-shade ElectroShades. MechoSystems side channels 2-5/8 inch (66.6 mm) may be used as center supports for ElectroShades; shade bands up to 8 high. For shade bands over 8 feet (2438 mm), provide ElectroShade side channels.

b. ElectroShade side channels, 2-1/2 inches (63.5 mm) wide by 1-3/16 inches (30.1 mm) deep; two-band center channels 5 inches (127 mm) wide by 1-3/16 inches (30.1 mm) deep. The 2-5/8 inch (66.6 mm) double-center channels may be installed at center-support positions of multi-band-shade ElectroShades. MechoSystems side channels 2-5/8 inches (66.6 mm) may be used as center supports for ElectroShades. Also provide for use with manually operated room darkening MechoSystems's over 8 feet (2438 mm) in height.
c. Color: Selected from manufacturer's standard colors or custom color as selected by Architect.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Do not begin installation until substrates have been properly prepared. If substrate preparation is the responsibility of another installer, notify Architect of unsatisfactory preparation before proceeding.

3.2 PREPARATION

A. Clean surfaces thoroughly prior to installation. Prepare surfaces using the methods recommended by the manufacturer for achieving the best result for the substrate under the project conditions.

B. Turn-Key Single-Source Responsibility for Interior Roller Shades: To control the responsibility for performance of the electric roller shade system; assign the design, engineering, and installation of electronic drive roller shade control system, shades, addressable controls, communication interfaces, and any required sensors, switches and low voltage control wiring specified in this Section to the manufacturer of the shade and control system. The Architect will not produce a set of electrical drawings for the installation of control wiring for the electric roller shade control system.
1. General Contractor Responsibilities:
a. Provide power panels and circuits of sufficient size to accommodate roller shade manufacturer's requirements, as indicated on the mechanical and electrical drawings and manufacturer's shop drawings.
b. Coordinate with requirements of subcontractor for this section before inaccessible areas are constructed.
c. Coordinate requirements of ALSCS before inaccessible areas are constructed.
d. Provide conduit with pull wire in all areas, which might not be accessible to ALSCS due to building design, equipment location or schedule:
e. Coordinate with the main building electrical subcontractor to provide duplex 120 VAC power receptacle in Electric closet for floor/riser Communication Gateways.
f. Verify that wiring conditions, which have been previously installed under other sections or at a previous time, are acceptable for product installation in accordance with manufacturer's instructions.
g. Comply with manufacturer's product data, including shop drawings, technical bulletins, product catalog installation instructions, and product carton instructions for installation.
h. Protect installed product and finished surfaces from damage during all phases of installation including preparation, testing, and cleanup.
i. Be responsible for all other required electrical work including but not limited to roof penetrations, conduits, fireproofing, etc.
j. Provide conduit with pull wire in all areas, which might not be accessible to subcontractor due to building design, equipment location or schedule.

2. Window Covering Subcontractor (WC) Responsibilities:
   a. Shade Control Subcontractor shall furnish and install shade controllers, interfaces, splitters, coupler, sensors, switches, junction boxes, etc mounted in the ceiling in an accessible location. Locations for all visible devices to be coordinated with Architect. The shade control subcontractor shall inspect all material included in this contract prior to installation. Manufacturer shall be notified of unacceptable material prior to installation.
   b. Line Voltage Wiring:
      1) WC to ROLLER SHADE EDU: The WC shall furnish and install power connection between Shade control system and EDU, and shall be capable of providing single line voltage wire pull for each EDU.
3. Shade Power Wiring (WC)
   a. Shall furnish and install line voltage Cable from roller shade motor into line voltage side of control system.
   b. Shall wire from General Contractor, provided, power junction box to each motor on the shade network.
   c. Shall furnish and install a disconnect plug at the end of the power wiring run to each EDU. The disconnect plug must mate with a matching disconnect plug on the motor cable. EDU cable disconnect plug must be prefabricated by the manufacturer to meet UL and ETL systems requirements.
4. Integration with Third Party Systems:
   a. Main Contractor shall coordinate and provide for others to furnish, install or program any interfaces or wiring to integrate 3rd party systems to the roller shade control system as specified herein. Integration to shade control network can be accomplished locally through dry contact closures, or RS-232.

3.3 INSTALLATION OF ROLLER SHADES

A. Contractor Furnish and Install Responsibilities:
   1. Window Covering Contractor (WC) shall provide an onsite, Project Manager, and shall be present for all related jobsite scheduling meetings.
   2. WC shall supervise the roller shade installation, and setting of intermediate stops of all shades to assure the alignment of the shade bands within a single EDU group, which shall not exceed +/- 0.125 inches (3.175 mm), and to assure the alignment between EDU groups, which shall not exceed +/- 0.25 inches (6.35 mm).
   3. WC shall be responsible for field inspection on an area-by- area and floor-by-floor basis during construction to confirm proper mounting conditions per approved shop drawings.
   4. Verification of Conditions: examine the areas to receive the work and the conditions under which the work would be performed and notify General Contractor and Owner of conditions detrimental to the proper and timely completion of the work. Do not proceed until unsatisfactory conditions have been corrected. Commencement of installation shall constitute acceptance of substrate conditions by the installer.
   5. WC shall provide accurate to 0.0625 inch (1.5875 mm); field measurements for custom shade fabrication on the Roller Shades manufacturers input forms.
   6. WC Installer shall install roller shades level, plumb, square, and true according to manufacturer's written instructions, and as specified here in. Blocking for roller shades installed under the contract of the interior General Contractor shall be installed plumb, level, and fitted to window mullion as per interior architect's design documents and in accordance with industry standard tolerances. The horizontal surface of the shade pocket shall not be out-of-level more than 0.625 inch (15.875 mm) over 20 linear feet (6.096 meters)
   7. Shades shall be located so the shade band is not closer than 2 inches (50 mm) to the interior face of the glass. Allow proper clearances for window operation hardware.
   8. Adjust, align and balance roller shades to operate smoothly, easily, safely, and free from binding or malfunction throughout entire operational range.
   9. Installer shall set Upper, Lower and up to 3 intermediate stop positions of all motorized shade bands, and assure alignment in accordance with the above requirements.

10. WC shall certify the operation of all motorized shades and turn over each floor for preliminary acceptance.
11. The WC shall participate and cooperate with the electrical contractor, the window shade manufacturer and the Commissioning agent to verify and certify the installation is in full conformance with the specifications and is fully operational. This work to occur during the commissioning stage and is in addition to preliminary acceptance required for each floor.
12. Clean roller shade surfaces after installation, according to manufacturer's written instructions.
13. WC shall train Owner's maintenance personnel to adjust, operate and maintain roller shade systems.
14. Protect installed products until completion of project.
15. Touch-up, repair or replace damaged products before Substantial Completion.

3.4 PROTECTION

A. Protect installed products until completion of project.

B. Touch-up, repair or replace damaged products before Substantial Completion.

END OF SECTION 12 24 13

Equinox Blackout
Color: 0105 Silver
Opaque

SHo Collection
1603 Broome
3% open

SECTION 12 93 13 BICYCLE RACKS

PART 1 GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUBMITTALS

A. Product Data: Include full range of standard color selections.

B. Shop Drawings: Indicate materials, dimensions, tolerances, welding, fasteners, hardware, mounting, finish, and accessories.

C. Quality Assurance Submittals:
1. Qualifications: Proof of manufacturer qualifications.
2. Manufacturer's Installation Instructions.

1.3 QUALITY ASSURANCE

A. Qualifications:
1. Manufacturer Qualifications: Minimum five years' experience in producing bicycle racks of the type specified.

1.4 DELIVERY, STORAGE, AND HANDLING

A. Delivery: Deliver materials to site in manufacturer's original, unopened containers and packaging, with labels clearly identifying product name and manufacturer.

B. Storage: Store materials in clean, dry area indoors in accordance with manufacturer's instructions.

C. Handling: Protect materials and finish from damage during handling and installation.

PART 2 PRODUCTS

2.1 MANUFACTURERS

A. Manufacturers listed whose product meet or exceed the specifications are approved for use on the Project. Other manufacturers must have a minimum of five (5) years' experience manufacturing products meeting or exceeding the specifications and comply with requirements regarding substitutions to be considered:
1. Ground Control Systems: Basis of Design.
2. AAA Ribbon Rack Co., Inc.
3. Bike Security Racks, Co., Inc.
4. Huntco Supply, LLC.

2.2 BICYCLE RACKS

A. Bike Docks:
1. The Varsity Bike Dock (DV215) or comparable product approved by Architect:
a. Steel: Refer to drawings for location and count:

1) ASTM A36 Steel for all structural steel plates.
2) ASTM A53 Steel for all pipes.

b. Guards: Two cushioned black injection molded urethane “Smart Guards” that attach to the Locking Loops (Wings).
c. Rail Docks: Ground mounted with wedge anchors provided by manufacturer.
d. Stem Angle: To provide handle-bar management.

PART 3 EXECUTION

3.1 EXAMINATION

A. Examine substrates upon which bicycle racks will be installed:
   1. Verify that surfaces are clean, flat and level.

B. Coordinate with responsible entity to perform corrective Work on unsatisfactory substrates.

C. Commencement of Work by installer is acceptance of substrate.

3.2 INSTALLATION

A. Install bicycle racks in accordance with manufacturer’s installation instructions.

B. Install bicycle racks level, plumb, square, accurately aligned, correctly located per drawings, and without warp.

C. Embedded mounting: Direct embedment of bicycle rack to be minimum of 10 1/2 inches in concrete in accordance with manufacturer’s instructions.

D. Use hardware and fasteners in accordance with manufacturer’s instructions.

E. Repair minor damage to finishes in accordance with manufacturer’s instructions and as approved by Architect.

3.3 CLEANING

A. Follow manufacturer’s instructions.

3.4 PROTECTION

A. Protect bicycle racks from damage due to other construction operations.

END OF SECTION 12 93 13

SECTION 12 93 14 BIKE LOCKERS

These specifications were current at the time of publication but are subject to change at any time without notice. Please confirm the accuracy of these specifications with the manufacturer and/or distributor prior to installation.

PART 1 GENERAL

1.1 SUMMARY

A. This section includes specifications for the Dero Locker.

1. Bikes parked per unit
   D1: 1 bike
   D2: 2 bikes

1.2 QUALITY ASSURANCE

A. Installer Qualifications: An experienced installer who has completed installation of bicycle racks similar in material, design, and extent to that indicated for this project and whose work has resulted in construction with a record of successful in-service performance.

B. Manufacturer Qualifications: A firm experienced in manufacturing bicycle racks similar to those required for this project and with a record of successful in-service performance.

C. Source Limitations: Obtain each color, finish, shape and type of bicycle rack from a single source with resources to provide components of consistent quality in appearance and physical properties.

D. Product Options: Drawings indicate size, shape and dimensional requirements of bicycle racks and are based on the specific system indicated.

1.3 SUBMITTALS

A. Product Data: Include physical characteristics such as shape, dimensions, bicycle, material parking capacity and finish for each bicycle rack.

B. Shop Drawings: Show installation details for each bicycle rack.

C. Samples for Verification: Submit finish samples for review and verification.

D. Maintenance Data: For each bicycle rack.

1. Include recommended methods for repairing damage to the finish.

1.4 DELIVERY, STORAGE AND HANDLING

A. Upon delivery, before signing for shipment, inspect for any damages and notate on the B.O.L.

B. Store bicycle racks in original undamaged packages and containers until ready for installation. Handle bicycle racks with sufficient care to prevent any scratches or damage to the finish.

WARRANTY

Bicycle lockers carry a one-year manufacturer's limited warranty against defects in materials and workmanship. The one-year warranty period begins the date the product is shipped from the manufacturer.

PART 2 PRODUCTS

2.1 ACCEPTABLE MANUFACTURERS

A. Provide bicycle racks manufactured by DERO BIKE RACK CO., 5522 Lakeland Ave. N, Minneapolis, MN 55429, 1-888-337-6729. Website: www.dero.com

2.2 MATERIALS

Frame: 1.50" x 3.00" x 14g tube.

Floor: 18g plate.

Sides: 18g plate.

Doors: 16g plate.

Top: 18g plate.

2.3 ELECTRICAL REQUIREMENTS

A. Only applicable to lockers ordered with the e-bike charging option.

B. Each locker ordered with the e-bike charging option requires:

1. Single locker = 120VAC 4A power supply.

2. Double locker = 120VAC 8A power supply.

Multiple units may be connected to one GFCI breaker circuit that can accommodate 4A per outlet.

C. All electrical wiring to be performed by a licensed electrician in accordance with NEC or the local electrical code. All wires and conduit supplied by installer.

D. Each outlet is equipped with a 4-hour timer and "start" button. Pressing the start button will allow power to the outlet for a period of 4 hours. Pressing the start button mid-cycle will restart the timer and it will run for an additional 4 hours. There is no "off" button. The 4-hour timer is to prevent e-bike batteries from over-charging.

2.4 FINISHES

A. Frame components are hot-dipped galvanized after fabrication.

B. Panel components are TGIC powder coated.

1. Over 250 high quality TGIC powder-coated colors are available from Dero Bike Rack Co. The following specifications are required: wash with Cal Clean 947 premium alkaline cleaner/degreaser and treat with Advantech P610A Zirconium for corrosion reduction and paint adhesion. An epoxy primer is electrostatically applied. A final TGIC, UV resistant polyester powder coat is applied. Final coating mil thickness shall be no less than 6 mils.

2.5 BIKE LOCKER

A. Required Space:
D1
Footprint: 32”x76”
Overall dimensions: L 76”, W 32”, H 48.5”
D2
Footprint: 38”x76”
Overall dimensions: L 76”, W 38”, H 48.5”

2.6 OPTIONS

A. Door security window for Transportation Safety Administration controlled areas. 28” x 15” x ¼” thick clear UV resistant polycarbonate window material.
B. E-bike 120 VAC charging outlets with 4-hour timers are available for use inside lockers.

PART 3 EXECUTION

3.1 INSTALLATION

A. Surface mount.

It is the responsibility of the installer to ensure that all base materials into which the shelter will be installed can support the rack and will not be damaged by any required installation procedures. See structural drawings for details.

3.2 ORDERING INFORMATION

A. When ordering or specifying this locker, make sure the product type, finish and fastener type (if applicable) are included. Contact your Dero representative for a current price list or to place an order.

B. Included in the price is a hot-dipped galvanized frame finish and a TGIC powder coat panel finish. The Bike Locker D1, D2 includes 4 wedge or Titen anchors.

3.3 FREIGHT

A. Call 1-888-337-6729 for freight quotes.

SECTION 14 21 23 ELECTRIC TRACTION MACHINE-ROOM-LESS ELEVATOR

PART 1 GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section includes, but is not limited to:
1. Standard pre-engineered elevator.
2. Elevator car enclosures, hoistway entrances and signal equipment.
3. Machine Room-less electric traction passenger elevator
4. Operation and control systems.
5. Accessibility provisions for physically disabled persons.
6. Equipment, machines, controls, systems and devices as required for safely operating the specified elevator at their rated speed and capacity.
7. Materials and accessories as required to complete the elevator installation.
8. Elevator maintenance contract.
9. All elevators shall have data cabling with “travel cables” for cameras and telephones.
10. The travel cable shall include cabling for analog phone, co-axial cabling for camera, and low voltage power/receptacle for camera.

B. Related Sections
1. Section 01 50 00: Temporary Facilities and Controls.
2. Section 03 30 00: Cast-In-Place Concrete:
3. Section 04 20 00: Unit Masonry.
4. Section 05 50 00: Metal Fabrications.
5. Division 26: Electrical:
   a. Main disconnects for each elevator.
   b. Electrical power for elevator installation and testing.
   c. Disconnecting device to elevator equipment prior to activation of sprinkler system.
   d. The installation of dedicated GFCI receptacles in the pit and overhead.
   e. Lighting in controller area, machine area and pit.
   f. Wiring for telephone service to controller.
6. Section 28 31 00: Fire Alarm Systems.
7. Section 27 51 23 - Telephone Systems.

C. References
1. American Society of Mechanical Engineers/American National Standards Institute (ASME/ANSI) A17.1, Code for Elevators
2. Americans with Disabilities Act (ADA)
3. Americans with Disability Act Accessibility Guidelines (ADAAG)
4. National Electric Code (NEC)
5. 2022 California Building Code (CBC)
6. Compliance Board's ADA-ABA Accessibility Guidelines and with ICC A117.1.

1.3 SUBMITTALS

A. Product Data: Include capacities, sizes, performances, operations, safety features, finishes, and similar information. Include product data for car enclosures, hoistway entrances, and operation, control, and signal systems.

B. Shop Drawings:
   1. Include plans, elevations, sections, and large-scale details indicating service at each landing, machine room layout, coordination with building structure, relationships with other construction, and locations of equipment.
   2. Include large-scale layout of car-control station.
   3. Indicate maximum dynamic and static loads imposed on building structure at points of support, and maximum and average power demands.

C. Samples for Initial Selection: For cab interior finishes.

D. Operation and Maintenance Data: For elevator to include in emergency, operation, and maintenance manuals.

E. Inspection and Acceptance Certificates and Operating Permits: As required by authorities having jurisdiction for normal, unrestricted elevator use.

F. Upon Substantial Completion, deliver to the Owner a complete set of service tools.

G. Provide one (1) electronic copy and two (2) hard copies of all manuals and inspection reports. Provide two complete printed sets of all service, parts, schematic diagrams and adjustment manuals for each elevator. Prints as required by state code for each elevator.

H. Provide four (4) copies of independent service keys. Provide 4 factory cut keys for every lock on each elevator. These are to be labeled as to their use Provide two extra copies of the independent service key for a total of 6.

I. Final inspection by the state inspector shall have an Owner's representative present from the Life Safety Department to observe. The final paperwork to the state needs to be completed so that it is returned to the school district maintenance department and not the contractor. The Owner shall apply for the operation / inspection certificate provided by the state inspector. The inspection cost shall be paid for by the elevator subcontractor / manufacturer.

1.4 QUALITY ASSURANCE

A. Comply with Section 407 in the U.S. Architectural & Transportation Barriers QUALITY ASSURANCE

B. Regulatory Requirements:
   1. Building Code: Comply with applicable provisions of the CBC and the Elevator Code.
   2. Elevator Standard: Comply with ASME A17.1.
   3. Fire Rated Hoistway Entrance Assemblies: Door and frame assemblies complying with NFPA 80 that are listed and labeled by a testing and inspecting agency acceptable to authorities having jurisdiction, for fire protection ratings indicated, based on testing at as close to neutral pressure as possible according to NFPA 252.
   4. Accessibility Requirements - Comply with applicable requirements:
      a. U.S. Architectural and Transportation Barriers Compliance Board Americans with Disabilities Act Accessibility Guidelines for Buildings and Facilities (ADAAG) 2010.
      b. ICC/ANSI A117.1 Accessible and Useable Building and Facilities.
      c. California Building Code 2022; Guidelines for Passenger Elevators.

C. Permits, Inspections and Certificates: The Elevator Contractor shall obtain and pay for necessary Municipal or State Inspection and permit as required by the elevator inspection authority, and make such tests as are called for by the regulations or such authorities. These tests shall be made in the presence of such authorities or their authorized

representatives.

D. Inspection and Testing - Elevator Installer shall obtain and pay for required inspections, tests, permits and fees for elevator installation:
   1. Arrange for inspections and make required tests.
   2. Deliver documentation to the Owner upon completion and acceptance of elevator work.

E. Manufacturer/Installer Qualifications - Elevator manufacturer having minimum 10 years documented experience who is trained and approved by manufacturer, including but not limited to:
   1. Manufacturer of the power unit, controller, signal fixtures, door operators cab, entrances, and other major parts of the elevator operating equipment.
   2. Primary and major equipment components are manufactured in the United States.
   3. Documented, ongoing quality assurance program.

F. Source Limitations - Obtain elevators through one source from a single manufacturer:
   1. Provide major elevator components, including pump and tank units, plunger-cylinder assemblies, controllers, signal fixtures, door operators, car frames, cabs, and entrances, manufactured by a single manufacturer.

G. Manufacturer: Minimum of fifteen years experience in the fabrication, installation and service of elevators of the type and performance of the specified. The manufacturer shall have a documented quality assurance program.

H. Coordinate installation of sleeves, block outs, elevator equipment with integral anchors, and other items that are embedded in concrete or masonry for elevator equipment. Furnish templates, sleeves, elevator equipment with integral anchors, and installation instructions and deliver to Project site in time for installation.

I. Coordinate locations and dimensions of other work relating to elevator including pit ladders; sumps and floor drains in pits; entrance subsills; electrical service; and electrical outlets, lights, and switches in hoistways, pits, and machine rooms.

J. Maintenance:
   1. In addition to the required maintenance and protection during construction, provide maintenance on the entire Work of this Section for a period of two (2) years commencing on the date of Substantial Completion. Maintenance shall include, but not necessarily be limited to:
      a. Systematic examination, adjustment, and lubrication of all elevator equipment.
      b. Repair or replacement of electrical and mechanical parts of the elevator installation as required, using only the genuine standard parts approved for the original installation.
      c. Maintenance work as required during regular working hours and regular working days, but with emergency callback service available at all times during this maintenance period.

1.5 WARRANTY

A. Manufacturer's Special Warranty: Manufacturer agrees to repair, restore, or replace elevator work that fails in materials or workmanship within specified warranty period.
   1. Failures include, but are not limited to, operation or control system failure, including excessive malfunctions; performances below specified ratings; excessive wear; unusual deterioration or aging of materials or finishes; unsafe conditions; need for excessive maintenance; abnormal noise or vibration; and similar unusual, unexpected, and unsatisfactory conditions.

2. Warranty Period: Two (2) year(s) from date of Substantial Completion.

1.6 DELIVERY, STORAGE, AND HANDLING

A. Deliver, store, and handle materials, components and equipment in manufacturer's protective packaging. Store materials, components, and equipment off the ground, under cover, and in a dry location.

PART 2 PRODUCTS

2.1 MANUFACTURER

A. Source Limitations: Obtain electric traction passenger elevator from single manufacturer.

B. Basis of Design Product:
1. **Kone Monospace DX500.** Manufacturers listed whose product meets or exceed the specifications may be used on the Project.
   a. Otis
   b. Thyssen Krupp.
   c. Schindler Elevator Corporation.
   d. Other manufacturers must have a minimum of five (5) years experience manufacturing products meeting or exceeding the specifications, and provide substitution forms.

2.2 ELEVATOR: GENERAL

A. The control system and car design based on materials and systems manufactured by Otis Elevator Company. The system shall consist of the following components:
1. Controller located entirely inside the hoistway. No extra machine room or control closet space required.
2. An AC gearless machine using embedded permanent magnets mounted at the top of the hoistway.
3. Polyurethane Coated-Steel Belts for elevator hoisting purposes.
4. Regenerative drive that captures normally wasted energy and feeds clean power back into the building’s power grid.
5. Sleep mode operation for LED ceiling lights and car fan.

2.3 ELECTRIC TRACTION ELEVATORS

A. Elevator System, General: Manufacturer's standard elevator systems. Unless otherwise indicated, manufacturers' standard components shall be used, as included in standard elevator systems and as required for complete system.

B. Elevator Description: Personal Elevator:
1. Equipment Description: Machine Room-less Electric Traction Elevator
2. Equipment Control: Elevonic® Control System.
3. Drive Regenerative.
4. Quantity of Elevators: 1
5. Elevator Stop Designations: Front Only at G,1,2,3,4,5,6,7,8,9 -etc. each level.
6. Maximum Stops: 10 - Unless otherwise noted on Drawings.
7. Openings: Front only 3’-6”
8. Travel: 80’-0””
9. Rated Capacity: 3000 lbs Passenger
10. Rated Speed: 150 fpm
11. Platform Size: 5'- 9-1/2" wide x 7'- 5-5/8" deep

12. Clear Inside Dimensions: 5'- 5-9/16" wide x 7'- 4-15/16" deep.

C. Elevator Cab:
1. Cab Height: 7'-9"
2. Clear Cab Height: 9'-9"

D. Power Requirements:
1. Main Power Supply: 480 Volts + or - 5% of normal, three-Phase, with a separate equipment grounding conductor.
2. Car Lighting Power Supply: 120 Volts, Single-phase, 15 Amp, 60 Hz.

E. Controller Location: Machine-Roomless Controller(s) shall be located at the front opening of the top terminal landing in the entrance frame.

F. Performance:
1. Car Speed: + 3 % of contract speed under any loading condition or direction of travel.
2. Car Capacity: Safely lower, stop and hold up to 120% of rated load. (code required).

G. Ride Quality:
1. Vertical Vibration (maximum): 20 milli-g
2. Horizontal Vibration (maximum): 12 milli-g
3. Vertical Jerk (maximum): 4.59 □ 1.0 ft./ sec3
4. Acceleration/Deceleration (maximum): 2.62 ft./ sec2
5. In Car Noise: 55 – 60 dB(A)
6. Stopping Accuracy: ± 0.375 in. max, ± 0.25 in. Typical.
7. Re-leveling Distance: 0.5 in. Operation: Simplex Collective Operation- Using a microprocessor-based controller, operation shall be automatic by means of the car and hall buttons. If all calls in the system have been answered, the car shall park at the last landing served.

H. Operating Features
1. Full Collective Operation
2. Anti-nuisance.
3. Fan and Light Protection.
4. Load Weighing Bypass.
5. Independent Service.
6. Full Collective Service.
7. Firefighters' Service Phase I and Phase II.
8. Top of Car Inspection.
9. Zoned Access at Upper Landing.

I. Door Control Features:
1. Door control to open doors automatically when car arrives at a landing in response to a normal hall or car call.
2. Elevator doors shall be provided with a reopening device that will stop and reopen the car door(s) and hoistway door(s) automatically should the door(s) become obstructed by an object or person.
3. Door protection shall consist of a two-dimensional, multi-beam array projecting across the car door opening.
4. Door nudging operation to occur if doors are prevented from

2.4 CONTROLLER COMPONENTS

A. Controller: A microcomputer-based control system shall be provided to perform all of the functions of safe elevator operation. The system shall also perform car and group

operational control.

1. All high voltage (110V or above) contact points inside the controller shall be protected from accidental contact when the controller doors are open.
2. Controller shall be separated into two distinct halves: Motor Drive side and Control side. High voltage motor power conductors shall be routed so as to be physically segregated from the rest of the controller.
3. Field conductor terminations points shall be segregated; high voltage (>30 volts DC and 110 VAC,) and low voltage (< 30 volts DC.
4. Controllers shall be designed and tested for Electromagnetic Interference (EMI) (immunity according to the EN 12016 (May 1998): “EMC Product Family Standards for lifts, escalators, and passenger conveyors Part 2 – immunity”)
5. Controller shall be located inside the wall next to the top landing entrance frame. Emergency access shall be provided through an access panel in the entrance frame secured by a key lock.
6. A separate control room or cabinet should not be required.

B. Drive: A Variable Voltage Variable Frequency AC drive system shall be provided. The drive shall be set up for regeneration of AC power back to the building grid.

2.5 MACHINE AND GOVENOR

A. Machine: AC gearless machine, with a synchronous permanent-magnet motor, dual solenoid service and emergency disc brakes, mounted at the top of the hoistway.

B. Governor: The governor shall be a tension type car-mounted governor.

C. Buffers, Car and Counterweight: Polyurethane type buffers shall be used.

D. Hoistway Operating Devices:
   1. Emergency stop switch in the pit
   2. Terminal stopping switches.

E. Positioning System: Consists of an encoder, reader box, and door zone vanes.

F. Guide Rails and Attachments: Guide rails shall be Tee-section steel rails with brackets and fasteners. Side counterweight arrangements shall have a dual-purpose bracket that combines both counterweight guide rails, and one of the car-guide rails to building fastening.

G. Coated-Steel Belts: Polyurethane coated belts with high-tensile-grade, zinc-plated steel cords and a flat profile on the running surface and the backside of the belt. All driving sheaves and deflector sheaves should have a crowned profile to ensure center tracking of the belts. A continuous 24/7 monitoring system using resistance-based technology has to be installed to continuously monitor the integrity of the coated steel belts and provide advanced notice of belt wear.

H. Governor Rope: Governor rope shall be steel and shall consist of at least eight strands wound about a sisal core center.

2.6 HOISTWAY COMPONENTS

A. Fascia: Stainless Steel sheet steel shall be provided at the front of the hoistway.

B. Hoistway Entrances:
   1. Frames: Entrance frames shall be of bolted construction for complete one-piece unit assembly. All frames shall be securely fastened to fixing angles mounted in the

hoistway and shall be of UL fire rated steel.
2. Sills shall be extruded aluminum.
3. Doors: Entrance doors shall be of metal construction with vertical channel reinforcements.
4. Fire Rating: Entrance and doors shall be UL fire rated for 1-1/2 hour (for M1, M2, M3, D1, and D2 Entrance Arrangements or 1 hour for D3 Entrance Arrangement.
5. Entrance Finish
6. Stainless Steel at Front All floors and Ground level.
7. Frame Finish
   a. Stainless Steel at Front All floors and Ground level.
   b. Entrance marking plates: Entrance jambs shall be marked with 4” x 4” plates having raised floor markings with Braille located adjacent to the floor marking. Marking plates shall be provided on both sides of the entrance.
8. Sight Guards: Black sight guards will be furnished with all doors.

2.7 CAR COMPONENTS

A. Car frame and Safety: A car frame fabricated from formed or structural steel members shall be provided with adequate bracing to support the platform and car enclosures. The car safety shall be integral to the car frame and shall be Type "B", flexible guide clamp type.

B. Cab Finishes:
1. Front Walls (Return Panels): Satin stainless steel, No. 4 finish.
2. Side and Rear Wall Panels: Satin stainless steel, No. 4 finish.
3. Reveals: Satin stainless steel, No. 4 finish.
4. Door Faces (Interior): Satin stainless steel, No. 4 finish.
5. Door Sills: Extruded Aluminum, mill finish.
6. Ceiling: Polished stainless steel, No. 8 finish.
7. Handrails: Handrails shall be 3/8”x 2” Flat Tubular satin stainless steel, No. 4 finish. Handrails shall be provided on the Side and Rear walls of the car enclosure.
8. Floor prepared to receive resilient flooring, specified elsewhere.
9. Ceiling Type: Flush Metal Ceiling with 4 LED lights
10. Wall Protection Pads: Provide removable wall “furniture” protection pads for each wall of each elevator and all necessary accessories for complete construction.

C. Emergency Car Lighting: An emergency power unit employing a 6-volt sealed rechargeable battery and totally static circuits shall be provided to illuminate the elevator car in the event of building power failure.

D. Fan: A one-speed 120 VAC fan will be mounted to the structural ceiling to facilitate in-car air circulation, meeting A17.1 code requirements. The fan shall be rubber mounted to prevent the transmission of structural vibration and will include a baffle to diffuse audible noise. A switch shall be provided in the car-operating panel to control the fan.

E. Emergency Exit Contact: An electrical contact shall be provided on the car-top exit.

F. Guides: The car shall have 3” diameter roller guides at top and bottom and the counterweight shall have slide type guides at the top and the bottom.

G. Platform: The car platform shall be constructed of metal. Load weighing device shall be mounted on the belts at the top of the hoistway.

H. Certificate frame- Provide a Certificate frame with a satin stainless steel finish.

I. LED ceiling lights and fan should automatically shut off when the system is not in use and

be powered back up after a passenger calls the elevator and pushes a hall button.

2.8 SIGNAL DEVICE AND FIXTURES

A. Car Operating Panel: A car operating panel shall be provided which contains all push buttons, key switches, and message indicators for elevator operation. The car operating panel shall have a satin stainless-steel finish.
   1. A car operating panel shall be furnished. It shall contain a bank of round stainless steel, mechanical LED illuminated buttons. Flush mounted to the panel and marked to correspond to the landings served. All buttons to have raised numerals and Braille markings with:
      a. Vandal-Resistant, Flush satin stainless steel button with blue LED illuminating center jewel.
   2. The car operating panel shall be equipped with the following features:
      a. Raised markings and Braille to the left-hand side of each push-button.
      b. Car Position Indicator at the top of an integral to the car operating panel.
      c. Door open and door close buttons.
      d. Inspection key-switch.
      e. Elevator Data Plate marked with elevator capacity and car number.
      f. Help Button: The help button shall initiate two-way communication between the car and a location inside the building, switching over to another location if the call is unanswered, where personnel are available who can take the appropriate action. Visual indicators are provided for call initiation and call acknowledgement.
      g. Emergency phones: Integrated elevator emergency phones dial CFPD dispatch direct.
      h. Landing Passing Signal: A chime bell shall sound in the car to signal that the car is either stopping at or passing a floor served by the elevator.
      i. In car stop switch (toggle or key unless local code prohibits use).
      j. Firefighter’s hat.
      k. Firefighter’s Phase II Key-switch.
      l. Call Cancel Button.
      m. Firefighter’s Phase II Emergency In-Car Operating Instructions: worded according to A17.1 2000, Article 2.27.7.2.

B. Car Position Indicator: A digital, LED car position indicator shall be integral to the car operating panel.

C. Hall Fixtures: Hall fixtures shall be provided with necessary push buttons and key switches for elevator operation.
   1. Integral Hall fixtures shall feature:
      a. Round stainless steel, mechanical buttons marked to correspond to the landings.
      b. Buttons shall be in vertically mounted fixture.
      c. Fixture shall be satin stainless-steel finish.
      d. Vandal-Resistant, Flush satin stainless steel button with blue LED illuminating center jewel

D. Car Lantern and Chime: A directional lantern visible from the corridor shall be provided in the car entrance. When the car stops and the doors are opening, the lantern shall indicate the direction in which the car is to travel and a chime will sound.

E. Access key-switch at top floor in entrance jamb.

F. Emergency Pictorial Signs: Fabricate from materials matching hall push-button stations, with text and graphics as required by authorities having jurisdiction, indicating that in case of fire, elevator is out of service and exits should be used instead. Provide one sign at each hall push-button station unless otherwise indicated.

PART 3 EXECUTION

3.1 INSPECTION

A. Examine the areas and conditions under which Work of this Section will be performed. Correct conditions detrimental to the proper and timely completion of the work. Do not proceed until satisfactory conditions have been corrected.

B. Provide Owner's Life Safety Department representative a minimum of 48 hours' notice for all inspections. Owner's Life Safety Department representative will attend all inspections.

3.2 INSTALLATION

A. Comply with manufacturer's written instructions and approved shop drawings.

B. Welded Construction: Provide welded connections for installing elevator work where bolted connections are not required for subsequent removal or for normal operation, adjustment, inspection, maintenance, and replacement of worn parts. Comply with AWS workmanship and welding operator qualification standards.

C. Sound Isolation: Mount rotating and vibrating equipment on vibration-isolating mounts to minimize vibration transmission to structure and structure-borne noise due to elevator system.

D. Lubricate operating parts of systems as recommended by manufacturers.

E. Alignment: Coordinate installation of hoistway entrances with installation of elevator guide rails for accurate alignment of entrances with car. Where possible, delay installation of sills and frames until car is operable in shaft. Reduce clearances to minimum, safe, workable dimension at each landing.

F. Leveling Tolerance: 1/8 inch, up or down, regardless of load and travel direction.

G. Set sills flush with finished floor surface at landing. Fill space under sill solidly with nonshrink, nonmetallic grout.

H. Locate hall signal equipment for elevator as follows, unless otherwise indicated:

I. Place hall lanterns either above or beside each hoistway entrance.

J. Mount hall lanterns at a minimum of 72 inches above finished floor.

3.3 FIELD QUALITY CONTROL

A. Acceptance Testing: On completion of elevator installation and before permitting elevator use (either temporary or permanent), perform acceptance tests as required and recommended by ASME A17.1/CSA B44 and by governing regulations and agencies.

B. Advise Owner, Architect, and authorities having jurisdiction in advance of dates and times that tests are to be performed on elevator.

3.4 PROTECTION

A. Temporary Use: Comply with the following requirements for each elevator used for construction purposes:

1. Provide car with temporary enclosure, either within finished car or in place of finished car, to protect finishes from damage.
2. Provide strippable protective film on entrance and car doors and frames.
3. Provide padded wood bumpers on entrance door frames covering jambs and frame faces.
4. Provide other protective coverings, barriers, devices, signs, and procedures as needed to protect elevator and elevator equipment.
5. Do not load elevator beyond the rated weight capacity.
6. Engage elevator Installer to provide full maintenance service. Include preventive maintenance, repair or replacement of worn or defective components, lubrication, cleanup, and adjustment as necessary for proper elevator operation at rated speed and capacity. Provide parts and supplies same as those used in the manufacture and installation of original equipment.
7. Engage elevator Installer to restore damaged work, if any, so no evidence remains of correction. Return items that cannot be refinished in the field to the shop, make required repairs and refinish entire unit, or provide new units as required.

3.5 DEMONSTRATION

A. Engage a factory-authorized service representative to train Owner's maintenance personnel to operate, adjust, and maintain elevator(s).

B. Check operation of each elevator with Owner's personnel present before date of Substantial Completion and again not more than one month before end of warranty period. Determine that operation systems and devices are functioning properly.

3.6 MAINTENANCE

A. Initial Maintenance Service: Beginning at Substantial Completion, maintenance service shall include 12 months' full maintenance by skilled employees of elevator Installer. Include monthly preventive maintenance, repair or replacement of worn or defective components, lubrication, cleaning, and adjusting as required for proper elevator operation. Parts and supplies shall be manufacturer's authorized replacement parts and supplies.
   1. Perform maintenance during normal working hours.
   2. Perform emergency callback service during normal working hours with response time of two hours or less.

END OF SECTION 14 21 23

SECTION 22 05 13 - COMMON MOTOR REQUIREMENTS FOR PLUMBING EQUIPMENT

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section includes general requirements for single-phase and polyphase, general-purpose, horizontal, small and medium, squirrel-cage induction motors for use on ac power systems up to 600 V and installed at equipment manufacturer's factory or shipped separately by equipment manufacturer for field installation.

1.3 COORDINATION

A. Coordinate features of motors, installed units, and accessory devices to be compatible with the following:

1. Motor controllers.
2. Torque, speed, and horsepower requirements of the load.
3. Ratings and characteristics of supply circuit and required control sequence.
4. Ambient and environmental conditions of installation location.

1.4 WORK INCLUDED

A. Furnish all labor, materials, services, testing, transportation and equipment necessary for the completion of all plumbing work as indicated on drawings and specified herein. Work materials and equipment not indicated or specified which is necessary for the complete and proper operation of the work of this Section in accordance with the true intent and meaning of the contract documents shall be provided and incorporated at no additional cost to the Owner.

1.5 QUALITY ASSURANCE

A. Code Requirements: All work covered by this Section shall conform to the latest requirements of the following regulations:

1. C.C.R., Title 24, Part 5 (2022 CPC).
2. 2022 California Plumbing Code.
3. SMACNA Seismic Restraint Manual Guidelines for Mechanical Systems.
4. National Fire Protection Association.
5. California State Division of Industrial Safety.
6. County Health Department.
7. Any other legally constituted body-having jurisdiction thereof.

B. Nothing in the specifications or drawings shall be construed to permit deviation from the requirements of governing codes unless approval for said deviation has been obtained from the legally constituted authorities having jurisdiction and from the Owner's representative.

1.6 DRAWINGS

A. Because of the small-scale drawings, it is not possible to indicate all offsets, fittings and accessories which may be required. The Contractor shall carefully investigate the conditions surrounding installation of his work, furnishing the necessary piping, fittings, valves, traps, and other devices which may be required to complete the installation.

B. The general arrangement indicated on the drawings shall be followed as closely as possible. Coordinate with the Architectural, Structural, Mechanical and Electrical Drawings and the work of other trades prior to installation of piping fixtures and equipment to verify adequate space available for installation of the work shown. In the event a field condition arises which makes it impossible to install the work as indicated, submit, in writing, the proposed departures to the Architect for his approval. Only when Architect's approval is given, in writing, shall Contractor proceed with installation of the work.

C. Special Note: Should the Contractor make changes in the installation differing from what is indicated on the contract drawings and not necessitated due to field conditions as indicated hereinabove, the Contractor shall be required to re-install the work to comply with what has been indicated on the contract drawings. Should it be impossible to re-install the work and the installation is in accordance with all governing authorities, the architect may permit the installation to remain. However, all costs incurred to revise the contract drawings by the engineer for resubmittal to the building department indicating the as-installed condition shall become the responsibility of the Contractor.

D. In case of a difference in the specifications or between the specifications and the drawings, the Contractor shall figure the most expensive alternate and after award of contract, shall secure direction from the Architect.

1.7 PERMITS, INSPECTIONS AND LICENSES

A. All permits, inspections and licenses required by the legally constituted authorities for installation of the work according to the plans and specifications shall be obtained and paid as a part of the work of this section.

1.8 EXAMINATION OF PREMISES

A. Before bidding on this work, Contractors shall make a careful examination of the premises and shall thoroughly familiarize themselves with the requirements of the contract. By the act of submitting a proposal for the work included in this contract, the Contractor shall be deemed to have made such study and examination, and that he is familiar with and accepts all conditions of the site.

1.9 PROTECTION

A. All work, equipment and materials shall be protected at all times. Contractor shall make good all damage caused either directly or indirectly by his own workmen. Contractor shall also protect his own work from damage. He shall close all pipe openings with caps or plugs during

installation. He shall protect all his equipment and materials against dirt, water, chemical and mechanical injury. Upon completion, all work shall be thoroughly cleaned and delivered in a new condition.

B. Contractor shall be held responsible for all damage to equipment and materials until he has received written notice from the Architect or Engineer that his work has been accepted.

1.10 LOCATIONS

A. The locations of apparatus, piping and equipment indicated on the drawings are approximate. Piping and equipment shall be installed in such a manner as to avoid all obstruction, preserve headroom, and keep openings and passages clear. The locations of and mounting heights of all fixtures shall be coordinated with the architectural plans and room elevations.

B. Clearances and Openings: Contractor shall cooperate and coordinate his work with all other trades to avoid conflict and permit for a neat and orderly appearance of the entire installation. The Contractor shall, in advance of the work, furnish instructions to the General Contractor as to his requirements for equipment and material installation of any kind, whether or not specifically mentioned on drawings or in the specifications, and shall include recesses, chases in walls, and all required openings in the structure. Should furnishing this information be neglected, delayed or incorrect and additional cuttings are found to be required, the cost of the same shall be charged to this Contractor.

C. Contractor shall verify and coordinate pipe routing with location of all electrical rooms, elevator equipment rooms, telecom/data rooms, and other rooms dedicated to the housing of switchgear, panels, or other electrical equipment. In no case shall piping be installed within or above the ceiling of such rooms.

1.11 SUBMITTAL DATA

A. Submittal Requirements:

1. Furnish, all at one time, prior to any installation, within the time noted below, six (6) copies of valid submittal data on all fixtures, material, equipment and devices. Each submitted item shall be indexed and referenced to these specifications and to identification numbers on fixtures and equipment schedules.
2. Manufacturers’ submittal literature and shop drawings are required on all items to ensure the latest and most complete manufacturer's data is available for review. Requirements of the submittals and Engineer's submittal notes are a part of the work of this Division except that Engineer's notes may not be used as a means of increasing the scope of work of this Division.
3. Submittals will be checked for general conformance with the design concept of the project but the review does not guarantee quantities shown and does not supersede requirements of this Division to properly install work.
4. To be valid, all submittals must:

    a. Be delivered to the Architect's office within thirty-five (35) days of award of the contract. Contractor shall make time allowance for Engineer’s review, return of comments, if any, and resubmittal if required. Corrections or changes in submittals returned as inadequate or incomplete shall be accomplished within this time limit.
    b. Clearly indicate and label as such any items proposed as substitution for that specified or shown on plans.
    c. Include all pertinent construction, installation, performance and technical data.

d. Have all product data sheets clearly labeled to indicate the individual items being submitted. In addition, all required options and accessories shall be clearly marked.

1) Product data sheets corresponding to items indicated on plans shall be clearly labeled with the corresponding fixture or equipment tag number.
2) Product data sheets corresponding to items indicated in specifications shall be clearly labeled with the specification section, page and item numbers.

e. Include, for every item which differs in size, configuration, connections, service, accessibility or any other significant way, a drawing to the same (or larger) scale as to the pertinent portions of the contract drawings. In this drawing show a complete layout of the system except that which is identical to the contract drawings, unless the unchanged portions must be shown to indicate such things as clearances. This drawing, together with the contract design drawings must show the complete system as revised to accommodate the proposed alternate.

B. Substitution Requirements:

1. Any items included in submittals and proposed by the Contractor as substitution for that specified or shown on plans shall be submitted within thirty five (35) days of award of the contract. After such time, proposed substitutions shall not be accepted for review, and the Contractor shall submit all items as specified or shown on plans.

a. For each item proposed as substitution for that specified or shown on plans, copies of product data sheets for the specified item shall be placed side by side with product data sheets for the proposed substitution item within the submittal.

1) In addition to the Submittal Requirements for labeling listed above, product data sheets for the specified item shall be clearly labeled “SPECIFIED ITEM, NOT SUBMITTED”. Product data sheets for the corresponding proposed substitution item shall be clearly labeled “PROPOSED SUBSTITUTION”.

b. Provide calculations and other detailed data justifying how any items proposed as substitution were selected for proposal. Data must be complete enough to permit detailed comparison of every significant characteristic for which the specified item was analyzed during design.

2. It shall be the Contractor’s responsibility to provide sufficient information to allow the Engineer to analyze any proposed alternate. If inadequate information is provided, the proposal will not be approved and resubmittal will not be allowed.
3. The Contractor shall provide or perform tests required by Engineer for purpose of judging acceptability of proposed substitutions.
4. The Contractor assumes full responsibility that alternate items and procedures will meet the job requirements and is responsible for cost of redesign and of modifications to this and other parts of work caused by alternate items furnished under work in this Section. In view of these responsibilities, it is the purpose of these specifications to establish procedures to ensure that the Contractor has considered all the ramifications of proposed alternates before submitting them for review. Submittals which do not comply with the requirements of these specifications or which indicate proposed alternates that were selected without proper regard to the requirements of the job will not be approved. No more than one proposed alternate will be considered for each item.
5. Alternate items installed without Engineer's approval will be replaced with specified items at Contractor's expense.

6. The Architect or his authorized representative shall be the sole judge as to the quality and suitability of proposed alternate equipment, fixtures or materials. Decisions of the Architect or that of his representative shall be final and conclusive.

1.12 UNINSPECTED WORK

A. The Contractor shall not allow or cause any of his work to be covered up or closed in until it has been inspected, tested, approved by all authorities have jurisdiction, and until Project Record drawings have been properly annotated.

B. Should any of his work be covered up or closed in before such inspection, he shall, at his own expense, uncover the work to the satisfaction of the inspection party. All related repair work cost shall be borne by the Contractor.

1.13 RECORD DRAWINGS

A. Contractor shall provide and keep up-to-date a complete "as-built" record set of blueline prints which shall show every change from the original drawings and the exact "as-built" locations and sizes of the work provided under this Section of the specifications. This set shall include locations, dimensions, depth of buried piping, cleanouts, shut-off valves, sewer invert locations, plugged wyes, tees, etc. On completion of the work, the Contractor shall incorporate all as-built information on a set of reproducible tracings provided by the Architect and this set of reproducibles shall be delivered to the Architect.

1.14 GUARANTEES

A. Contractor shall guarantee the entire plumbing and piping systems unconditionally for a period of one (1) year after final acceptance. If, during this period, any materials, equipment, or any part of the systems fail to function properly, the Contractor shall make good the defects promptly and without any expense to the Owner.

B. Contractor shall be responsible for all damage to any part of the premises caused by leaks in pipelines or equipment furnished and installed under this Section for a period of one (1) year after date of acceptance of his work.

C. All equipment and fixtures shall carry manufacturer's warranty against defective parts or poor workmanship for not less than one (1) year. See specific equipment specifications for extended warranty requirements.

PART 2 - PRODUCTS

2.1 GENERAL MOTOR REQUIREMENTS

A. Comply with NEMA MG 1 unless otherwise indicated.

B. Comply with IEEE 841 for severe-duty motors.

2.2 MOTOR CHARACTERISTICS

A. Duty: Continuous duty at ambient temperature of 40°C and at altitude of 3300 feet above sea level.

B. Capacity and Torque Characteristics: Sufficient to start, accelerate, and operate connected loads at designated speeds, at installed altitude and environment, with indicated operating sequence, and without exceeding nameplate ratings or considering service factor.

2.3 POLYPHASE MOTORS

A. Description: NEMA MG 1, Design B, medium induction motor.

B. Efficiency: Energy efficient, as defined in NEMA MG 1.

C. Service Factor: 1.15.

D. Multispeed Motors: Variable torque.

1. For motors with 2:1 speed ratio, consequent pole, single winding.
2. For motors with other than 2:1 speed ratio, separate winding for each speed.

E. Multispeed Motors: Separate winding for each speed.

F. Rotor: Random-wound, squirrel cage.

G. Bearings: Regreasable, shielded, antifriction ball bearings suitable for radial and thrust loading.

H. Temperature Rise: Match insulation rating.

I. Insulation: Class F.

J. Code Letter Designation:
1. Motors Smaller than 15 HP: Manufacturer's standard starting characteristic.

K. Enclosure Material: Cast iron for motor frame sizes 324T and larger; rolled steel for motor frame sizes smaller than 324T.

2.4 POLYPHASE MOTORS WITH ADDITIONAL REQUIREMENTS

A. Motors Used with Reduced-Voltage and Multispeed Controllers: Match wiring connection requirements for controller with required motor leads. Provide terminals in motor terminal box, suited to control method.

B. Motors Used with Variable Frequency Controllers: Ratings, characteristics, and features coordinated with and approved by controller manufacturer.

1. Windings: Copper magnet wire with moisture-resistant insulation varnish, designed and tested to resist transient spikes, high frequencies, and short time rise pulses produced by pulse-width modulated inverters.
2. Energy- and Premium-Efficient Motors: Class B temperature rise; Class F insulation.
3. Inverter-Duty Motors: Class F temperature rise; Class H insulation.

4. Thermal Protection: Comply with NEMA MG 1 requirements for thermally protected motors.

C. Severe-Duty Motors: Comply with IEEE 841, with 1.15 minimum service factor.

2.5 SINGLE-PHASE MOTORS

A. Motors larger than 1/20 hp shall be one of the following, to suit starting torque and requirements of specific motor application:

1. Permanent-split capacitor.
2. Split phase.
3. Capacitor start, inductor run.
4. Capacitor start, capacitor run.

B. Multispeed Motors: Variable-torque, permanent-split-capacitor type.

C. Bearings: Prelubricated, antifriction ball bearings or sleeve bearings suitable for radial and thrust loading.

D. Motors 1/20 HP and Smaller: Shaded-pole type.

E. Thermal Protection: Internal protection to automatically open power supply circuit to motor when winding temperature exceeds a safe value calibrated to temperature rating of motor insulation. Thermal-protection device shall automatically reset when motor temperature returns to normal range.

PART 3 - EXECUTION (Not Applicable)

END OF SECTION 22 05 13

SECTION 22 05 17 - SLEEVES AND SLEEVE SEALS FOR PLUMBING PIPING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section Includes:

1. Sleeves.
2. Sleeve-seal systems.
3. Grout.

1.3 WORK INCLUDED

A. Furnish all labor, materials, services, testing, transportation and equipment necessary for the completion of all plumbing work as indicated on drawings and specified herein. Work materials and equipment not indicated or specified which is necessary for the complete and proper operation of the work of this Section in accordance with the true intent and meaning of the contract documents shall be provided and incorporated at no additional cost to the Owner.

1.4 QUALITY ASSURANCE

A. Code Requirements: All work covered by this Section shall conform to the latest requirements of the following regulations:

1. C.C.R., Title 24, Part 5 (2022 CPC).
2. 2022 California Plumbing Code.
3. SMACNA Seismic Restraint Manual Guidelines for Mechanical Systems.
4. National Fire Protection Association.
5. California State Division of Industrial Safety.
6. County Health Department.
7. Any other legally constituted body-having jurisdiction thereof.

B. Nothing in the specifications or drawings shall be construed to permit deviation from the requirements of governing codes unless approval for said deviation has been obtained from the legally constituted authorities having jurisdiction and from the Owner's representative.

1.5 DRAWINGS

A. Because of the small-scale drawings, it is not possible to indicate all offsets, fittings and accessories which may be required. The Contractor shall carefully investigate the conditions surrounding installation of his work, furnishing the necessary piping, fittings, valves, traps, and other devices which may be required to complete the installation.

B. The general arrangement indicated on the drawings shall be followed as closely as possible. Coordinate with the Architectural, Structural, Mechanical and Electrical Drawings and the work of other trades prior to installation of piping fixtures and equipment to verify adequate space available for installation of the work shown. In the event a field condition arises which makes it impossible to install the work as indicated, submit, in writing, the proposed departures to the Architect for his approval. Only when Architect's approval is given, in writing, shall Contractor proceed with installation of the work.

C. Special Note: Should the Contractor make changes in the installation differing from what is indicated on the contract drawings and not necessitated due to field conditions as indicated hereinabove, the Contractor shall be required to re-install the work to comply with what has been indicated on the contract drawings. Should it be impossible to re-install the work and the installation is in accordance with all governing authorities, the architect may permit the installation to remain. However, all costs incurred to revise the contract drawings by the engineer for resubmittal to the building department indicating the as-installed condition shall become the responsibility of the Contractor.

D. In case of a difference in the specifications or between the specifications and the drawings, the Contractor shall figure the most expensive alternate and after award of contract, shall secure direction from the Architect.

1.6 PERMITS, INSPECTIONS AND LICENSES

A. All permits, inspections and licenses required by the legally constituted authorities for installation of the work according to the plans and specifications shall be obtained and paid as a part of the work of this section.

1.7 EXAMINATION OF PREMISES

A. Before bidding on this work, Contractors shall make a careful examination of the premises and shall thoroughly familiarize themselves with the requirements of the contract. By the act of submitting a proposal for the work included in this contract, the Contractor shall be deemed to have made such study and examination, and that he is familiar with and accepts all conditions of the site.

1.8 PROTECTION

A. All work, equipment and materials shall be protected at all times. Contractor shall make good all damage caused either directly or indirectly by his own workmen. Contractor shall also protect his own work from damage. He shall close all pipe openings with caps or plugs during installation. He shall protect all his equipment and materials against dirt, water, chemical and mechanical injury. Upon completion, all work shall be thoroughly cleaned and delivered in a new condition.

B. Contractor shall be held responsible for all damage to equipment and materials until he has received written notice from the Architect or Engineer that his work has been accepted.

1.9 LOCATIONS

A. The locations of apparatus, piping and equipment indicated on the drawings are approximate. Piping and equipment shall be installed in such a manner as to avoid all obstruction, preserve

headroom, and keep openings and passages clear. The locations of and mounting heights of all fixtures shall be coordinated with the architectural plans and room elevations.

B. Clearances and Openings: Contractor shall cooperate and coordinate his work with all other trades to avoid conflict and permit for a neat and orderly appearance of the entire installation. The Contractor shall, in advance of the work, furnish instructions to the General Contractor as to his requirements for equipment and material installation of any kind, whether or not specifically mentioned on drawings or in the specifications, and shall include recesses, chases in walls, and all required openings in the structure. Should furnishing this information be neglected, delayed or incorrect and additional cuttings are found to be required, the cost of the same shall be charged to this Contractor.

C. Contractor shall verify and coordinate pipe routing with location of all electrical rooms, elevator equipment rooms, telecom/data rooms, and other rooms dedicated to the housing of switchgear, panels, or other electrical equipment. In no case shall piping be installed within or above the ceiling of such rooms.

1.10 SUBMITTAL DATA

A. Submittal Requirements:

1. Furnish, all at one time, prior to any installation, within the time noted below, six (6) copies of valid submittal data on all fixtures, material, equipment and devices. Each submitted item shall be indexed and referenced to these specifications and to identification numbers on fixtures and equipment schedules.
2. Manufacturers' submittal literature and shop drawings are required on all items to ensure the latest and most complete manufacturer's data is available for review. Requirements of the submittals and Engineer's submittal notes are a part of the work of this Division except that Engineer's notes may not be used as a means of increasing the scope of work of this Division.
3. Submittals will be checked for general conformance with the design concept of the project but the review does not guarantee quantities shown and does not supersede requirements of this Division to properly install work.
4. To be valid, all submittals must:

    a. Be delivered to the Architect's office within thirty-five (35) days of award of the contract. Contractor shall make time allowance for Engineer's review, return of comments, if any, and resubmittal if required. Corrections or changes in submittals returned as inadequate or incomplete shall be accomplished within this time limit.
    b. Clearly indicate and label as such any items proposed as substitution for that specified or shown on plans.
    c. Include all pertinent construction, installation, performance and technical data.
    d. Have all product data sheets clearly labeled to indicate the individual items being submitted. In addition, all required options and accessories shall be clearly marked.

        1) Product data sheets corresponding to items indicated on plans shall be clearly labeled with the corresponding fixture or equipment tag number.
        2) Product data sheets corresponding to items indicated in specifications shall be clearly labeled with the specification section, page and item numbers.

    e. Include, for every item which differs in size, configuration, connections, service, accessibility or any other significant way, a drawing to the same (or larger) scale as to the pertinent portions of the contract drawings. In this drawing show a

complete layout of the system except that which is identical to the contract drawings, unless the unchanged portions must be shown to indicate such things as clearances. This drawing, together with the contract design drawings must show the complete system as revised to accommodate the proposed alternate.

B. Substitution Requirements:

1. Any items included in submittals and proposed by the Contractor as substitution for that specified or shown on plans shall be submitted within thirty five (35) days of award of the contract. After such time, proposed substitutions shall not be accepted for review, and the Contractor shall submit all items as specified or shown on plans.

   a. For each item proposed as substitution for that specified or shown on plans, copies of product data sheets for the specified item shall be placed side by side with product data sheets for the proposed substitution item within the submittal.

      1) In addition to the Submittal Requirements for labeling listed above, product data sheets for the specified item shall be clearly labeled “SPECIFIED ITEM, NOT SUBMITTED”. Product data sheets for the corresponding proposed substitution item shall be clearly labeled “PROPOSED SUBSTITUTION”.

   b. Provide calculations and other detailed data justifying how any items proposed as substitution were selected for proposal. Data must be complete enough to permit detailed comparison of every significant characteristic for which the specified item was analyzed during design.

2. It shall be the Contractor’s responsibility to provide sufficient information to allow the Engineer to analyze any proposed alternate. If inadequate information is provided, the proposal will not be approved and resubmittal will not be allowed.
3. The Contractor shall provide or perform tests required by Engineer for purpose of judging acceptability of proposed substitutions.
4. The Contractor assumes full responsibility that alternate items and procedures will meet the job requirements and is responsible for cost of redesign and of modifications to this and other parts of work caused by alternate items furnished under work in this Section. In view of these responsibilities, it is the purpose of these specifications to establish procedures to ensure that the Contractor has considered all the ramifications of proposed alternates before submitting them for review. Submittals which do not comply with the requirements of these specifications or which indicate proposed alternates that were selected without proper regard to the requirements of the job will not be approved. No more than one proposed alternate will be considered for each item.
5. Alternate items installed without Engineer's approval will be replaced with specified items at Contractor's expense.
6. The Architect or his authorized representative shall be the sole judge as to the quality and suitability of proposed alternate equipment, fixtures or materials. Decisions of the Architect or that of his representative shall be final and conclusive.

1.11 UNINSPECTED WORK

A. The Contractor shall not allow or cause any of his work to be covered up or closed in until it has been inspected, tested, approved by all authorities have jurisdiction, and until Project Record drawings have been properly annotated.

B. Should any of his work be covered up or closed in before such inspection, he shall, at his own expense, uncover the work to the satisfaction of the inspection party. All related repair work cost shall be borne by the Contractor.

1.12 RECORD DRAWINGS

A. Contractor shall provide and keep up-to-date a complete "as-built" record set of blueline prints which shall show every change from the original drawings and the exact "as-built" locations and sizes of the work provided under this Section of the specifications. This set shall include locations, dimensions, depth of buried piping, cleanouts, shut-off valves, sewer invert locations, plugged wyes, tees, etc. On completion of the work, the Contractor shall incorporate all as-built information on a set of reproducible tracings provided by the Architect and this set of reproducibles shall be delivered to the Architect.

1.13 GUARANTEES

A. Contractor shall guarantee the entire plumbing and piping systems unconditionally for a period of one (1) year after final acceptance. If, during this period, any materials, equipment, or any part of the systems fail to function properly, the Contractor shall make good the defects promptly and without any expense to the Owner.

B. Contractor shall be responsible for all damage to any part of the premises caused by leaks in pipelines or equipment furnished and installed under this Section for a period of one (1) year after date of acceptance of his work.

C. All equipment and fixtures shall carry manufacturer's warranty against defective parts or poor workmanship for not less than one (1) year. See specific equipment specifications for extended warranty requirements.

PART 2 - PRODUCTS

2.1 SLEEVES: Shall be plastic or galvanized steel where pipes pass through concrete walls or floor slabs.

A. Isolate pipes through ground floor slabs with Kraft paper, plastic tape or similar materials unless conduit is specified or indicated.

B. Sleeves for pipes through exterior walls shall be non-metallic with minimum 2” weep ring as manufactured by Link Seal. Pipe shall be sealed with Link Seal modular seal with EPDM seal elements.

C. Sleeves in or through fire rated walls shall be per U.L. Fire Resistance System No. WL1146 for drywall construction, and U.L. Fire Resistance System No. CAJ1044 for concrete construction. See architectural plans for all locations of rated walls.

D. Galvanized-Steel Wall Pipes: ASTM A 53/A 53M, Schedule 40, with plain ends and welded steel collar; zinc coated.

E. Galvanized-Steel-Pipe Sleeves: ASTM A 53/A 53M, Type E, Grade B, Schedule 40, zinc coated, with plain ends.

F. Molded-PE or -PP Sleeves: Removable, tapered-cup shaped, and smooth outer surface with nailing flange for attaching to wooden forms.

2.2 SLEEVE-SEAL SYSTEMS

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1. Advance Products & Systems, Inc.
2. Metraflex Company (The).
3. Pipeline Seal and Insulator, Inc.

B. Description: Modular sealing-element unit, designed for field assembly, for filling annular space between piping and sleeve.

1. Sealing Elements: EPDM-rubber interlocking links shaped to fit surface of pipe. Include type and number required for pipe material and size of pipe.
2. Pressure Plates: Stainless steel.
3. Connecting Bolts and Nuts: Stainless steel of length required to secure pressure plates to sealing elements.

2.3 GROUT

A. Standard: ASTM C 1107/C 1107M, Grade B, post-hardening and volume-adjusting, dry, hydraulic-cement grout.

B. Characteristics: Nonshrink; recommended for interior and exterior applications.

C. Design Mix: 5000-psi, 28-day compressive strength.

D. Packaging: Premixed and factory packaged.

PART 3 - EXECUTION

3.1 SLEEVE INSTALLATION

A. Install sleeves for piping passing through penetrations in floors, partitions, roofs, and walls.

B. For sleeves that will have sleeve-seal system installed, select sleeves of size large enough to provide 1-inch annular clear space between piping and concrete slabs and walls.

1. Sleeves are not required for core-drilled holes.

C. Install sleeves in concrete floors, concrete roof slabs, and concrete walls as new slabs and walls are constructed.

1. Permanent sleeves are not required for holes in slabs formed by molded-PE or -PP sleeves.
2. Cut sleeves to length for mounting flush with both surfaces.
3. Using grout, seal the space outside of sleeves in slabs and walls without sleeve-seal system.

D. Install sleeves for pipes passing through interior partitions.

1. Cut sleeves to length for mounting flush with both surfaces.
2. Install sleeves that are large enough to provide 1/4-inch annular clear space between sleeve and pipe or pipe insulation.
3. Seal annular space between sleeve and piping or piping insulation; use joint sealants appropriate for size, depth, and location of joint. Comply with requirements for sealants specified in Section 079200 "Joint Sealants."

E. Fire-Barrier Penetrations: Maintain indicated fire rating of walls, partitions, ceilings, and floors at pipe penetrations. Seal pipe penetrations with firestop materials. Comply with requirements for firestopping specified in Section 078413 "Penetration Firestopping."

3.2 SLEEVE-SEAL-SYSTEM INSTALLATION

A. Install sleeve-seal systems in sleeves in exterior concrete walls and slabs-on-grade at service piping entries into building.

B. Select type, size, and number of sealing elements required for piping material and size and for sleeve ID or hole size. Position piping in center of sleeve. Center piping in penetration, assemble sleeve-seal system components, and install in annular space between piping and sleeve. Tighten bolts against pressure plates that cause sealing elements to expand and make a watertight seal.

3.3 SLEEVE AND SLEEVE-SEAL SCHEDULE

A. Use sleeves and sleeve seals for the following piping-penetration applications:

1. Exterior Concrete Walls below Grade:

   a. Piping Smaller Than NPS 6: Galvanized-steel wall sleeves with sleeve-seal system.

      1) Select sleeve size to allow for 1-inch annular clear space between piping and sleeve for installing sleeve-seal system.

2. Concrete Slabs-on-Grade:

   a. Piping Smaller Than NPS 6: Galvanized-steel wall sleeves with sleeve-seal system.

      1) Select sleeve size to allow for 1-inch annular clear space between piping and sleeve for installing sleeve-seal system.

3. Concrete Slabs above Grade:

   a. Piping Smaller Than NPS 6: Galvanized-steel-pipe sleeves.

4. Interior Partitions:

   a. Piping Smaller Than NPS 6: Galvanized-steel-pipe sleeves.

END OF SECTION 22 05 17

SECTION 22 05 18 - ESCUTCHEONS FOR PLUMBING PIPING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section Includes:

1. Escutcheons.
2. Floor plates.

1.3 WORK INCLUDED

A. Furnish all labor, materials, services, testing, transportation and equipment necessary for the completion of all plumbing work as indicated on drawings and specified herein. Work materials and equipment not indicated or specified which is necessary for the complete and proper operation of the work of this Section in accordance with the true intent and meaning of the contract documents shall be provided and incorporated at no additional cost to the Owner.

1.4 QUALITY ASSURANCE

A. Code Requirements: All work covered by this Section shall conform to the latest requirements of the following regulations:

1. C.C.R., Title 24, Part 5 (2022 CPC).
2. 2022 California Plumbing Code.
3. SMACNA Seismic Restraint Manual Guidelines for Mechanical Systems.
4. National Fire Protection Association.
5. California State Division of Industrial Safety.
6. County Health Department.
7. Any other legally constituted body-having jurisdiction thereof.

B. Nothing in the specifications or drawings shall be construed to permit deviation from the requirements of governing codes unless approval for said deviation has been obtained from the legally constituted authorities having jurisdiction and from the Owner's representative.

1.5 DRAWINGS

A. Because of the small-scale drawings, it is not possible to indicate all offsets, fittings and accessories which may be required. The Contractor shall carefully investigate the conditions surrounding installation of his work, furnishing the necessary piping, fittings, valves, traps, and other devices which may be required to complete the installation.

B. The general arrangement indicated on the drawings shall be followed as closely as possible. Coordinate with the Architectural, Structural, Mechanical and Electrical Drawings and the work of other trades prior to installation of piping fixtures and equipment to verify adequate space available for installation of the work shown. In the event a field condition arises which makes it impossible to install the work as indicated, submit, in writing, the proposed departures to the Architect for his approval. Only when Architect's approval is given, in writing, shall Contractor proceed with installation of the work.

C. Special Note: Should the Contractor make changes in the installation differing from what is indicated on the contract drawings and not necessitated due to field conditions as indicated hereinabove, the Contractor shall be required to re-install the work to comply with what has been indicated on the contract drawings. Should it be impossible to re-install the work and the installation is in accordance with all governing authorities, the architect may permit the installation to remain. However, all costs incurred to revise the contract drawings by the engineer for resubmittal to the building department indicating the as-installed condition shall become the responsibility of the Contractor.

D. In case of a difference in the specifications or between the specifications and the drawings, the Contractor shall figure the most expensive alternate and after award of contract, shall secure direction from the Architect.

1.6 PERMITS, INSPECTIONS AND LICENSES

A. All permits, inspections and licenses required by the legally constituted authorities for installation of the work according to the plans and specifications shall be obtained and paid as a part of the work of this section.

1.7 EXAMINATION OF PREMISES

A. Before bidding on this work, Contractors shall make a careful examination of the premises and shall thoroughly familiarize themselves with the requirements of the contract. By the act of submitting a proposal for the work included in this contract, the Contractor shall be deemed to have made such study and examination, and that he is familiar with and accepts all conditions of the site.

1.8 PROTECTION

A. All work, equipment and materials shall be protected at all times. Contractor shall make good all damage caused either directly or indirectly by his own workmen. Contractor shall also protect his own work from damage. He shall close all pipe openings with caps or plugs during installation. He shall protect all his equipment and materials against dirt, water, chemical and mechanical injury. Upon completion, all work shall be thoroughly cleaned and delivered in a new condition.

B. Contractor shall be held responsible for all damage to equipment and materials until he has received written notice from the Architect or Engineer that his work has been accepted.

1.9 LOCATIONS

A. The locations of apparatus, piping and equipment indicated on the drawings are approximate. Piping and equipment shall be installed in such a manner as to avoid all obstruction, preserve

headroom, and keep openings and passages clear. The locations of and mounting heights of all fixtures shall be coordinated with the architectural plans and room elevations.

B. Clearances and Openings: Contractor shall cooperate and coordinate his work with all other trades to avoid conflict and permit for a neat and orderly appearance of the entire installation. The Contractor shall, in advance of the work, furnish instructions to the General Contractor as to his requirements for equipment and material installation of any kind, whether or not specifically mentioned on drawings or in the specifications, and shall include recesses, chases in walls, and all required openings in the structure. Should furnishing this information be neglected, delayed or incorrect and additional cuttings are found to be required, the cost of the same shall be charged to this Contractor.

C. Contractor shall verify and coordinate pipe routing with location of all electrical rooms, elevator equipment rooms, telecom/data rooms, and other rooms dedicated to the housing of switchgear, panels, or other electrical equipment. In no case shall piping be installed within or above the ceiling of such rooms.

1.10 SUBMITTAL DATA

A. Submittal Requirements:

1. Furnish, all at one time, prior to any installation, within the time noted below, six (6) copies of valid submittal data on all fixtures, material, equipment and devices. Each submitted item shall be indexed and referenced to these specifications and to identification numbers on fixtures and equipment schedules.
2. Manufacturers' submittal literature and shop drawings are required on all items to ensure the latest and most complete manufacturer's data is available for review. Requirements of the submittals and Engineer's submittal notes are a part of the work of this Division except that Engineer's notes may not be used as a means of increasing the scope of work of this Division.
3. Submittals will be checked for general conformance with the design concept of the project but the review does not guarantee quantities shown and does not supersede requirements of this Division to properly install work.
4. To be valid, all submittals must:

    a. Be delivered to the Architect's office within thirty-five (35) days of award of the contract. Contractor shall make time allowance for Engineer's review, return of comments, if any, and resubmittal if required. Corrections or changes in submittals returned as inadequate or incomplete shall be accomplished within this time limit.
    b. Clearly indicate and label as such any items proposed as substitution for that specified or shown on plans.
    c. Include all pertinent construction, installation, performance and technical data.
    d. Have all product data sheets clearly labeled to indicate the individual items being submitted. In addition, all required options and accessories shall be clearly marked.

        1) Product data sheets corresponding to items indicated on plans shall be clearly labeled with the corresponding fixture or equipment tag number.
        2) Product data sheets corresponding to items indicated in specifications shall be clearly labeled with the specification section, page and item numbers.

    e. Include, for every item which differs in size, configuration, connections, service, accessibility or any other significant way, a drawing to the same (or larger) scale as to the pertinent portions of the contract drawings. In this drawing show a

complete layout of the system except that which is identical to the contract drawings, unless the unchanged portions must be shown to indicate such things as clearances. This drawing, together with the contract design drawings must show the complete system as revised to accommodate the proposed alternate.

B. Substitution Requirements:

1. Any items included in submittals and proposed by the Contractor as substitution for that specified or shown on plans shall be submitted within thirty five (35) days of award of the contract. After such time, proposed substitutions shall not be accepted for review, and the Contractor shall submit all items as specified or shown on plans.

   a. For each item proposed as substitution for that specified or shown on plans, copies of product data sheets for the specified item shall be placed side by side with product data sheets for the proposed substitution item within the submittal.

      1) In addition to the Submittal Requirements for labeling listed above, product data sheets for the specified item shall be clearly labeled “SPECIFIED ITEM, NOT SUBMITTED”. Product data sheets for the corresponding proposed substitution item shall be clearly labeled “PROPOSED SUBSTITUTION”.

   b. Provide calculations and other detailed data justifying how any items proposed as substitution were selected for proposal. Data must be complete enough to permit detailed comparison of every significant characteristic for which the specified item was analyzed during design.

2. It shall be the Contractor’s responsibility to provide sufficient information to allow the Engineer to analyze any proposed alternate. If inadequate information is provided, the proposal will not be approved and resubmittal will not be allowed.
3. The Contractor shall provide or perform tests required by Engineer for purpose of judging acceptability of proposed substitutions.
4. The Contractor assumes full responsibility that alternate items and procedures will meet the job requirements and is responsible for cost of redesign and of modifications to this and other parts of work caused by alternate items furnished under work in this Section. In view of these responsibilities, it is the purpose of these specifications to establish procedures to ensure that the Contractor has considered all the ramifications of proposed alternates before submitting them for review. Submittals which do not comply with the requirements of these specifications or which indicate proposed alternates that were selected without proper regard to the requirements of the job will not be approved. No more than one proposed alternate will be considered for each item.
5. Alternate items installed without Engineer's approval will be replaced with specified items at Contractor's expense.
6. The Architect or his authorized representative shall be the sole judge as to the quality and suitability of proposed alternate equipment, fixtures or materials. Decisions of the Architect or that of his representative shall be final and conclusive.

1.11 UNINSPECTED WORK

A. The Contractor shall not allow or cause any of his work to be covered up or closed in until it has been inspected, tested, approved by all authorities have jurisdiction, and until Project Record drawings have been properly annotated.

B. Should any of his work be covered up or closed in before such inspection, he shall, at his own expense, uncover the work to the satisfaction of the inspection party. All related repair work cost shall be borne by the Contractor.

1.12 RECORD DRAWINGS

A. Contractor shall provide and keep up-to-date a complete "as-built" record set of blueline prints which shall show every change from the original drawings and the exact "as-built" locations and sizes of the work provided under this Section of the specifications. This set shall include locations, dimensions, depth of buried piping, cleanouts, shut-off valves, sewer invert locations, plugged wyes, tees, etc. On completion of the work, the Contractor shall incorporate all as-built information on a set of reproducible tracings provided by the Architect and this set of reproducibles shall be delivered to the Architect.

1.13 GUARANTEES

A. Contractor shall guarantee the entire plumbing and piping systems unconditionally for a period of one (1) year after final acceptance. If, during this period, any materials, equipment, or any part of the systems fail to function properly, the Contractor shall make good the defects promptly and without any expense to the Owner.

B. Contractor shall be responsible for all damage to any part of the premises caused by leaks in pipelines or equipment furnished and installed under this Section for a period of one (1) year after date of acceptance of his work.

C. All equipment and fixtures shall carry manufacturer's warranty against defective parts or poor workmanship for not less than one (1) year. See specific equipment specifications for extended warranty requirements.

PART 2 - PRODUCTS

2.1 ESCUTCHEONS

A. One-Piece, Cast-Brass Type: With polished, chrome-plated and rough-brass finish and setscrew fastener.

B. One-Piece, Deep-Pattern Type: Deep-drawn, box-shaped brass with chrome-plated finish and spring-clip fasteners.

2.2 FLOOR PLATES

A. One-Piece Floor Plates: Cast-iron flange with holes for fasteners.

B. Split-Casting Floor Plates: Cast brass with concealed hinge.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Install escutcheons for piping penetrations of walls, ceilings, and finished floors.

B. Install escutcheons with ID to closely fit around pipe, tube, and insulation of insulated piping and with OD that completely covers opening.

1. Escutcheons for New Piping:

a. Piping with Fitting or Sleeve Protruding from Wall: One-piece, deep-pattern type.
b. Chrome-Plated Piping: One-piece, cast-brass type with polished, chrome-plated finish.
c. Bare Piping at Wall and Floor Penetrations in Finished Spaces: One-piece, cast-brass type with polished, chrome-plated finish.
d. Bare Piping at Ceiling Penetrations in Finished Spaces: One-piece, cast-brass type with polished, chrome-plated finish.
e. Bare Piping in Unfinished Service Spaces: One-piece, cast-brass type with polished, chrome-plated or rough-brass finish.
f. Bare Piping in Equipment Rooms: One-piece, cast-brass type with polished, chrome-plated or rough-brass finish.

C. Install floor plates for piping penetrations of equipment-room floors.

D. Install floor plates with ID to closely fit around pipe, tube, and insulation of piping and with OD that completely covers opening.

1. New Piping: One-piece, floor-plate type.
2. Existing Piping: Split-casting, floor-plate type.

3.2 FIELD QUALITY CONTROL

A. Replace broken and damaged escutcheons and floor plates using new materials.

END OF SECTION 22 05 18

SECTION 22 05 23 - GENERAL-DUTY VALVES FOR PLUMBING PIPING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section Includes:
1. Bronze ball valves.
2. Ductile-iron, single-flange butterfly valves.
3. Bronze lift check valves.
4. Bronze swing check valves.
5. Bronze gate valves.
6. Iron gate valves
7. Manual circuit balancing valves.
8. Gas shut-off cocks.
9. LPG shut-off cocks.

B. Related Sections:

1. Division 2 water distribution piping Sections for general-duty and specialty valves for site construction piping.
2. Division 15 plumbing piping Sections for specialty valves applicable to those Sections only.
3. Division 15 Section "Identification for Plumbing Piping and Equipment" for valve tags and schedules.

1.3 DEFINITIONS

A. CWP: Cold working pressure.

B. EPDM: Ethylene propylene diene terpolymer rubber.

C. NBR: Acrylonitrile-butadiene, Buna-N, or nitrile rubber.

D. NRS: Nonrising stem.

E. OS&Y: Outside screw and yoke.

F. RS: Rising stem.

G. SWP: Steam working pressure.

1.4 WORK INCLUDED

A. Furnish all labor, materials, services, testing, transportation and equipment necessary for the completion of all plumbing work as indicated on drawings and specified herein. Work materials and equipment not indicated or specified which is necessary for the complete and proper operation of the work of this Section in accordance with the true intent and meaning of the contract documents shall be provided and incorporated at no additional cost to the Owner.

1.5 QUALITY ASSURANCE

A. Code Requirements: All work covered by this Section shall conform to the latest requirements of the following regulations:

1. C.C.R., Title 24, Part 5 (2022 CPC).
2. 2022 California Plumbing Code.
3. SMACNA Seismic Restraint Manual Guidelines for Mechanical Systems.
4. National Fire Protection Association.
5. California State Division of Industrial Safety.
6. County Health Department.
7. Any other legally constituted body-having jurisdiction thereof.

B. Nothing in the specifications or drawings shall be construed to permit deviation from the requirements of governing codes unless approval for said deviation has been obtained from the legally constituted authorities having jurisdiction and from the Owner's representative.

1.6 DRAWINGS

A. Because of the small-scale drawings, it is not possible to indicate all offsets, fittings and accessories which may be required. The Contractor shall carefully investigate the conditions surrounding installation of his work, furnishing the necessary piping, fittings, valves, traps, and other devices which may be required to complete the installation.

B. The general arrangement indicated on the drawings shall be followed as closely as possible. Coordinate with the Architectural, Structural, Mechanical and Electrical Drawings and the work of other trades prior to installation of piping fixtures and equipment to verify adequate space available for installation of the work shown. In the event a field condition arises which makes it impossible to install the work as indicated, submit, in writing, the proposed departures to the Architect for his approval. Only when Architect's approval is given, in writing, shall Contractor proceed with installation of the work.

C. Special Note: Should the Contractor make changes in the installation differing from what is indicated on the contract drawings and not necessitated due to field conditions as indicated hereinabove, the Contractor shall be required to re-install the work to comply with what has been indicated on the contract drawings. Should it be impossible to re-install the work and the installation is in accordance with all governing authorities, the architect may permit the installation to remain. However, all costs incurred to revise the contract drawings by the engineer for resubmittal to the building department indicating the as-installed condition shall become the responsibility of the Contractor.

D. In case of a difference in the specifications or between the specifications and the drawings, the Contractor shall figure the most expensive alternate and after award of contract, shall secure direction from the Architect.

1.7 PERMITS, INSPECTIONS AND LICENSES

A. All permits, inspections and licenses required by the legally constituted authorities for installation of the work according to the plans and specifications shall be obtained and paid as a part of the work of this section.

1.8 EXAMINATION OF PREMISES

A. Before bidding on this work, Contractors shall make a careful examination of the premises and shall thoroughly familiarize themselves with the requirements of the contract. By the act of submitting a proposal for the work included in this contract, the Contractor shall be deemed to have made such study and examination, and that he is familiar with and accepts all conditions of the site.

1.9 PROTECTION

A. All work, equipment and materials shall be protected at all times. Contractor shall make good all damage caused either directly or indirectly by his own workmen. Contractor shall also protect his own work from damage. He shall close all pipe openings with caps or plugs during installation. He shall protect all his equipment and materials against dirt, water, chemical and mechanical injury. Upon completion, all work shall be thoroughly cleaned and delivered in a new condition.

B. Contractor shall be held responsible for all damage to equipment and materials until he has received written notice from the Architect or Engineer that his work has been accepted.

1.10 LOCATIONS

A. The locations of apparatus, piping and equipment indicated on the drawings are approximate. Piping and equipment shall be installed in such a manner as to avoid all obstruction, preserve headroom, and keep openings and passages clear. The locations of and mounting heights of all fixtures shall be coordinated with the architectural plans and room elevations.

B. Clearances and Openings: Contractor shall cooperate and coordinate his work with all other trades to avoid conflict and permit for a neat and orderly appearance of the entire installation. The Contractor shall, in advance of the work, furnish instructions to the General Contractor as to his requirements for equipment and material installation of any kind, whether or not specifically mentioned on drawings or in the specifications, and shall include recesses, chases in walls, and all required openings in the structure. Should furnishing this information be neglected, delayed or incorrect and additional cuttings are found to be required, the cost of the same shall be charged to this Contractor.

C. Contractor shall verify and coordinate pipe routing with location of all electrical rooms, elevator equipment rooms, telecom/data rooms, and other rooms dedicated to the housing of switchgear, panels, or other electrical equipment. In no case shall piping be installed within or above the ceiling of such rooms.

1.11 SUBMITTAL DATA

A. Submittal Requirements:

1. Furnish, all at one time, prior to any installation, within the time noted below, six (6) copies of valid submittal data on all fixtures, material, equipment and devices. Each submitted item shall be indexed and referenced to these specifications and to identification numbers on fixtures and equipment schedules.
2. Manufacturers' submittal literature and shop drawings are required on all items to ensure the latest and most complete manufacturer's data is available for review. Requirements of the submittals and Engineer's submittal notes are a part of the work of this Division except that Engineer's notes may not be used as a means of increasing the scope of work of this Division.
3. Submittals will be checked for general conformance with the design concept of the project but the review does not guarantee quantities shown and does not supersede requirements of this Division to properly install work.
4. To be valid, all submittals must:

    a. Be delivered to the Architect's office within thirty-five (35) days of award of the contract. Contractor shall make time allowance for Engineer's review, return of comments, if any, and resubmittal if required. Corrections or changes in submittals returned as inadequate or incomplete shall be accomplished within this time limit.
    b. Clearly indicate and label as such any items proposed as substitution for that specified or shown on plans.
    c. Include all pertinent construction, installation, performance and technical data.
    d. Have all product data sheets clearly labeled to indicate the individual items being submitted. In addition, all required options and accessories shall be clearly marked.

        1) Product data sheets corresponding to items indicated on plans shall be clearly labeled with the corresponding fixture or equipment tag number.
        2) Product data sheets corresponding to items indicated in specifications shall be clearly labeled with the specification section, page and item numbers.

    e. Include, for every item which differs in size, configuration, connections, service, accessibility or any other significant way, a drawing to the same (or larger) scale as to the pertinent portions of the contract drawings. In this drawing show a complete layout of the system except that which is identical to the contract drawings, unless the unchanged portions must be shown to indicate such things as clearances. This drawing, together with the contract design drawings must show the complete system as revised to accommodate the proposed alternate.

B. Substitution Requirements:

1. Any items included in submittals and proposed by the Contractor as substitution for that specified or shown on plans shall be submitted within thirty five (35) days of award of the contract. After such time, proposed substitutions shall not be accepted for review, and the Contractor shall submit all items as specified or shown on plans.

a. For each item proposed as substitution for that specified or shown on plans, copies of product data sheets for the specified item shall be placed side by side with product data sheets for the proposed substitution item within the submittal.

1) In addition to the Submittal Requirements for labeling listed above, product data sheets for the specified item shall be clearly labeled “SPECIFIED ITEM, NOT SUBMITTED”. Product data sheets for the corresponding proposed substitution item shall be clearly labeled “PROPOSED SUBSTITUTION”.

b. Provide calculations and other detailed data justifying how any items proposed as substitution were selected for proposal. Data must be complete enough to permit detailed comparison of every significant characteristic for which the specified item was analyzed during design.

2. It shall be the Contractor’s responsibility to provide sufficient information to allow the Engineer to analyze any proposed alternate. If inadequate information is provided, the proposal will not be approved and resubmittal will not be allowed.
3. The Contractor shall provide or perform tests required by Engineer for purpose of judging acceptability of proposed substitutions.
4. The Contractor assumes full responsibility that alternate items and procedures will meet the job requirements and is responsible for cost of redesign and of modifications to this and other parts of work caused by alternate items furnished under work in this Section. In view of these responsibilities, it is the purpose of these specifications to establish procedures to ensure that the Contractor has considered all the ramifications of proposed alternates before submitting them for review. Submittals which do not comply with the requirements of these specifications or which indicate proposed alternates that were selected without proper regard to the requirements of the job will not be approved. No more than one proposed alternate will be considered for each item.
5. Alternate items installed without Engineer's approval will be replaced with specified items at Contractor's expense.
6. The Architect or his authorized representative shall be the sole judge as to the quality and suitability of proposed alternate equipment, fixtures or materials. Decisions of the Architect or that of his representative shall be final and conclusive.

1.12 QUALITY ASSURANCE

A. Source Limitations for Valves: Obtain each type of valve from single source from single manufacturer.

B. ASME Compliance:

1. ASME B16.10 and ASME B16.34 for ferrous valve dimensions and design criteria.
2. ASME B31.1 for power piping valves.
3. ASME B31.9 for building services piping valves.

C. NSF Compliance: NSF 61-G and NSF-372 for valve materials for potable-water service.

1. Valves for domestic water must comply with the Federal Reduction of Lead in Drinking Water Act.
   a. “Lead Free” refers to the wetted surface of pipe, fittings and fixtures in potable water systems that have a weighted average lead content ≤ 0.25%.
   b. All valves must be 3rd party certified.

c. Bronze valves shall be made of dezincification-resistant material.

1.13 DELIVERY, STORAGE, AND HANDLING

A. Prepare valves for shipping as follows:

1. Protect internal parts against rust and corrosion.
2. Protect threads, flange faces, grooves, and weld ends.
3. Set angle, gate, and globe valves closed to prevent rattling.
4. Set ball and plug valves open to minimize exposure of functional surfaces.
5. Set butterfly valves closed or slightly open.
6. Block check valves in either closed or open position.

B. Use the following precautions during storage:

1. Maintain valve end protection.
2. Store valves indoors and maintain at higher than ambient dew point temperature. If outdoor storage is necessary, store valves off the ground in watertight enclosures.

C. Use sling to handle large valves; rig sling to avoid damage to exposed parts. Do not use handwheels or stems as lifting or rigging points.

1.14 UNINSPECTED WORK

A. The Contractor shall not allow or cause any of his work to be covered up or closed in until it has been inspected, tested, approved by all authorities have jurisdiction, and until Project Record drawings have been properly annotated.

B. Should any of his work be covered up or closed in before such inspection, he shall, at his own expense, uncover the work to the satisfaction of the inspection party. All related repair work cost shall be borne by the Contractor.

1.15 RECORD DRAWINGS

A. Contractor shall provide and keep up-to-date a complete "as-built" record set of blueline prints which shall show every change from the original drawings and the exact "as-built" locations and sizes of the work provided under this Section of the specifications. This set shall include locations, dimensions, depth of buried piping, cleanouts, shut-off valves, sewer invert locations, plugged wyes, tees, etc. On completion of the work, the Contractor shall incorporate all as-built information on a set of reproducible tracings provided by the Architect and this set of reproducibles shall be delivered to the Architect.

1.16 GUARANTEES

A. Contractor shall guarantee the entire plumbing and piping systems unconditionally for a period of one (1) year after final acceptance. If, during this period, any materials, equipment, or any

part of the systems fail to function properly, the Contractor shall make good the defects promptly and without any expense to the Owner.

B. Contractor shall be responsible for all damage to any part of the premises caused by leaks in pipelines or equipment furnished and installed under this Section for a period of one (1) year after date of acceptance of his work.

C. All equipment and fixtures shall carry manufacturer's warranty against defective parts or poor workmanship for not less than one (1) year. See specific equipment specifications for extended warranty requirements.

PART 2 - PRODUCTS

2.1 GENERAL REQUIREMENTS FOR VALVES

A. Refer to valve schedule articles for applications of valves.

B. Piping systems shall be supplied with valves arranged so as to give complete and regulating control of each building and piping systems throughout the building, and located so all parts are easily accessible and maintained.

1. Valve Design: Rising stem or outside screw and yoke stems. Non-rising stem valves may be used where space conditions prevent full extension of rising stems.
2. Sizes: Same size as upstream pipe, unless otherwise indicated.
3. Extended stems: Where piping insulation is indicated or specified, valves shall be equipped with 2” extended handles of non-thermal conductive material. Also provide a protective sleeve that allows operation of the valve without breaking the vapor seal or disturbing the insulation. Supply with memory stops, which are fully adjustable after insulation is applied.
4. End Connection: 2 inch and under shall be threaded, 2-1/2 inches and larger shall be flanged or full lug style.

C. Valves for Potable Water must comply with California Lead Free Law, effective January 1, 2010.

1. “Lead Free” refers to the wetted surface of pipe, fittings and fixtures in potable water systems that have a weighted average lead content ≤ 0.25%. Source: California Health & Safety Code (116875).
2. All valves must be 3rd party certified.
3. Bronze valves shall be made with dezincification-resistant material.

D. Where possible, valves of one manufacturer shall be used.

E. Provide Class 150 valves meeting the valve specifications where Class 125 valves are specified but are not available.

F. Bronze valves shall be made with dezincification-resistant materials, (Bronze ASTM B62, B61, or B584 Alloy C87850). This includes body, ball, stem and / or trim.

G. Bronze Valves: NPS 2 and smaller with threaded ends, unless otherwise indicated.

H. Ferrous Valves: NPS 2-1/2 and larger with flanged ends, unless otherwise indicated.

I. Valve Pressure and Temperature Ratings: Not less than indicated and as required for system pressures and temperatures.

J. Valve Sizes: Same as upstream piping unless otherwise indicated.

K. Valve Actuator Types:

1. Hand-wheel: For valves other than quarter-turn types.
2. Hand-lever: For quarter-turn valves NPS 6 and smaller.

L. Valves in Insulated Piping: With 2-inch stem extensions and the following features:

1. Ball Valves: With extended operating handle of non-thermal-conductive material, and protective sleeve that allows operation of valve without breaking the vapor seal or disturbing insulation and memory stops that are fully adjustable after insulation is applied.

a. Basis-of-Design Product: Subject to compliance with requirements, provide NIBCO Nib-seal handle extension or comparable product by one of the following:

b. General valves:

1) NIBCO
2) Hammond
3) Milwaukee

c. Below grade domestic water shut-off valves (gate valves) 2” and larger:

1) NIBCO.
2) Clow.
3) Mueller.

d. Butterfly Valves:

1) NIBCO.
2) Demco.
3) Dezuric.

e. Plug Valves:

1) Hammond.
2) Milwaukee.

f. Check valves, lift type:

1) Hammond.
2) Milwaukee.

g. Below grade backwater valve isolation valves:

1) NIBCO.
2) Clow.
3) Mueller.

2. Butterfly Valves: With extended neck.

M. Valve-End Connections:

1. Flanged: With flanges according to ASME B16.1 for iron valves, ASME B16.5 for steel valves.
2. Grooved: With grooves according to AWWA C606.
3. Solder Joint: With sockets according to ASME B16.18.
4. Threaded: With threads according to ASME B1.20.1.

N. Valve Bypass and Drain Connections: MSS SP-45.

2.2 BRONZE BALL VALVES

A. Three-Piece, Full-Port, Bronze Ball Valves with Stainless-Steel Trim & Nib-Seal Handle:

1. Basis-of-Design Product: Subject to compliance with requirements, provide NIBCO Model S-595-Y-66-LF or T-595-Y-66-LF or a comparable product by one of the following,

   a. Milwaukee Valve Company.
   b. Apollo.

2. Description:

   c. Standard: MSS SP-110, NSF 61-G.
   d. CWP Rating: 600 psig.
   e. Body Design: Three piece with threaded body packnut design (no threaded stem designs allowed) with adjustable stem packing.
   f. Body Material: Bronze ASTM B 584 Alloy C87850 or C87600.
   g. Ends: Threaded or Solder.
   h. Seats: PTFE or TFE.
   i. Stem: 316 Stainless steel.
   j. Ball: 316 Stainless steel, vented.
   k. Port: Full.

B. Two-Piece, Full-Port, Bronze Ball Valves with Stainless-Steel Trim & Nib-Seal Handle:

1. Basis-of-Design Product: Subject to compliance with requirements, provide NIBCO Model S-585-66-LF or T-585-66-LF or a comparable product by one of the following:

   a. Conbraco Industries, Inc.; Apollo Div.
   b. Milwaukee Valve Company.

2. Description:

   a. Standard: MSS SP-110, NSF 61-G.
   b. CWP Rating: 600 psig.
   c. Body Design: Two piece with threaded body packnut design (no threaded stem designs allowed) with adjustable stem packing.
   d. Body Material: Bronze ASTM B 584 Alloy C87600.
   e. Ends: Threaded or Solder.
   f. Seats: PTFE or TFE.
   g. Stem: 316 Stainless steel.
   h. Ball: 316 Stainless steel, vented.

i. Port: Full.

C. 200 CWP, Sizes 2-1/2" – 24", Ductile Iron, Single-Flange Butterfly Valves with EPDM Seat and Aluminum-Bronze Disc:

1. Basis-of-Design Product: Subject to compliance with requirements, provide NIBCO Model LD-2000-3/5, or a comparable product by one of the following:

a. Cooper Cameron Corp.; Cooper Cameron Valves Div.
b. Tyco International, Ltd.; Tyco Valves & Controls

2. Description:

a. Standard: MSS SP-67, Type I, IAPMO.
b. NPS 24 (DN 300) and Smaller CWP Rating: 200 psig (1380 kPa).
c. Body Design: Full Lug type; Bubble tight shutoff, suitable for bidirectional dead-end service at rated pressure without use of downstream flange.
d. Body Material: ASTM A 536, ductile iron.
e. Seat: EPDM.
f. Stem: One- or two-piece stainless steel.
g. Disc: Aluminum bronze

D. Retain one or more of six paragraphs in this article if iron, single-flange butterfly valves are required. MSS SP-67 covers iron, single-flange butterfly valves NPS 1-1/2 to NPS 72.

2.3 BRONZE LIFT CHECK VALVES

A. Class 125, Lift Check Valves with Nonmetallic TFE Disc:

1. Basis-of-Design Product: Subject to compliance with requirements, provide NIBCO Model S-480-Y-LF or T-480-Y-LF or a comparable product by one of the following:

a. Hammond.
b. Milwaukee.

2. Description:

a. Standard: MSS SP-80, Type 2, NSF 61-G.
b. CWP Rating: 200 psig.
c. Body Design: Vertical flow.
d. Body Material: ASTM B 584 Alloy C87850, lead free bronze.
e. Ends: Threaded or Solder.
f. Disc: PTFE, or TFE.

2.4 BRONZE SWING CHECK VALVES

A. Class 125, Bronze Swing Check Valves with Nonmetallic TFE Disc:

1. Basis-of-Design Product: Subject to compliance with requirements, provide NIBCO Model S-413-Y-LF or T-413-Y-LF or a comparable product by one of the following:

a. Crane Co.; Crane Valve Group; Crane Valves.
b. Powell Valves.

2. Description:

a. Standard: MSS SP-80, Type 4, NSF 61-G.
b. CWP Rating: 200 psig.
c. Body Design: Y-pattern Horizontal flow.
d. Body Material: ASTM B 584 Alloy C87850, lead free bronze.
e. Ends: Threaded or Solder.
f. Disc: PTFE or TFE.

2.5 BRONZE GATE VALVES

A. NRS Bronze Gate Valves:

1. Basis-of-Design Product: Subject to compliance with requirements, provide NIBCO Model S-113-LF or T-113-LF or a comparable product by one of the following:

a. Crane Co.; Crane Valve Group; Crane Valves.
b. Powell Valves.

2. Description:

a. Standard: MSS SP-139, Type 2, NSF 61-G.
b. CWP Rating: 200 psig.
c. Body Material: ASTM B 584, dezincification-resistant bronze with integral seat and threaded bonnet.
d. Ends: Threaded or Solder.
e. Stem: Lead free Silicon Bronze.
f. Disc: Solid wedge; lead free bronze.
g. Packing: Asbestos free.
h. Handwheel: Malleable iron.

B. RS Bronze Gate Valves:

1. Basis-of-Design Product: Subject to compliance with requirements, provide NIBCO Model S-111-LF or T-111-LF or a comparable product by one of the following:

a. Crane Co.; Crane Valve Group; Crane Valves.
b. Powell Valves

2. Description:
a. Standard: MSS SP-80, Type 2, NSF 61-G.
b. CWP Rating: 200 psig.
c. Body Material: ASTM B584 C87850 dezincification resistant bronze with integral seat and threaded bonnet.
d. Ends: Threaded or Solder.
e. Stem: Lead free silicon bronze.
f. Disc: Solid wedge, lead free bronze.

g. Packing: Asbestos free.
h. Handwhell: Malleable iron.

2.6 IRON GATE VALVES

A. Class 125, Ductile-Iron Resilient Wedge Gate Valves:

1. Basis-of-Design Product: Subject to compliance with requirements, provide NIBCO Model F-619-RWS (NRS) or F-607-RWS (OS&Y) or a comparable product by one of the following:

   a. Clow
   b. Mueller

2. Description:

   a. Standard: AWWA C-509 and C-515,
   b. CWP Rating: 300 psig.
   c. Body Material: ASTM A-536 ductile iron, fusion-bonded epoxy coating inside and out.
   d. Ends: Flanged.
   e. Trim: stainless steel.
   f. Disc: Rubber encapsulated ductile iron wedge.
   g. Packing and Gasket: Asbestos free.

2.7 MANUAL CIRCUIT BALANCING VALVES

A. Bronze, Fixed Orifice, Balancing Valves (2” and smaller):

1. Basis-of-Design Product: Subject to compliance with requirements, provide NIBCO Model T/S-1810-LF or a comparable product by one of the following:

   a. Or approved equal

2. Description:

   a. CWP Rating: 300 psig
   b. Maximum Operating Temperature: 260°F.
   c. Body Material: Bronze or dezincification-resistant brass, lead free, Y-pattern globe type with fixed orifice (venture) for precise regulation and control. NO QUARTER TURN VALVES WILL BE ACCEPTED.
   d. Plug: Bronze or dezincification-resistant brass with EPDM O-Rings.
   e. Seat: Bronze or dezincification-resistant brass.
   f. Ends: Threaded or Solder.
   g. Pressure Gage Connections: Shall have two metering test ports with internal check and protective caps for use with portable differential pressure metering stations.
   h. Handle Style: Calibrated hand wheel equipped with visual position readout and hidden memory stops for repeatable regulation and control.

B. Cast-Iron or Steel, Calibrated-Orifice, Balancing Valves (2-1/2” and larger):

1. Basis-of-Design Product: Subject to compliance with requirements, provide NIBCO Model F/G 737A or a comparable product by one of the following:

   a. Tour & Andersson

2. Description:

   a. CWP Rating: 240 psig
   b. Maximum Operating Temperature: 250°F.
   c. Body Material: Cast-iron or steel body, globe pattern with calibrated orifice. NO BUTTERFLY VALVES.
   d. Stem Seals: EPDM O-Rings
   e. Disc: EPDM coated cast-iron disc.
   f. Seat: Bronze or dezincification brass.
   g. Ends: Flanged or grooved.
   h. Pressure Gage Connection: Integral seals for portable differential pressure meter.
   i. Handle Style: Calibrated hand wheel equipped with visual position readout and concealed memory stops for repeatable regulation and control.

2.8 GAS SHUT-OFF COCKS:

A. Gas Shut-Off Cocks, Above Grade (4” and smaller):

1. Basis-of-Design Product: Subject to compliance with requirements, provide NIBCO Model T-FP-600-A or a comparable product by one of the following:

   a. Or approved equal.

2. Description:

   a. Standard: MSS SP-110
   b. CWP Rating: 600 psig.
   c. SWP Rating: 150 psig.
   d. Gas Rating: CSA certified and UL/FM listed.
   e. Body Design: Two piece with threaded body pack nut design (no threaded stem designs al-lowed) with adjustable stem packing.
   f. Body Material: Dezincification-resistant brass.
   g. Seats: PTFE
   h. Ball: Chrome-plated brass
   i. Ends: Threaded
   j. Port: Full

B. Gas Shut-Off Cocks, Below Grade:

1. Basis-of-Design Product: Subject to compliance with requirements, provide Nordstom “Poly-Gas” or comparable product by one of the following:

   a. Or approved equal.

2. Description:

a. Standards: ASTM D-2513 and ANSI B16.40
b. Valve boxes: cast iron tops marked “GAS”, high-impact heavy-duty ABS valve can as manufactured by C.O. Test Services-VALVCO, Inc. or equal.

2.9 **LPG SHUT-OFF COCKS**:

A. LPG Shut-Off Cocks, Above Grade (3” and smaller):

1. Basis-of-Design Product: Subject to compliance with requirements, provide NIBCO Model T-585-70-UL (1/2” – 1”) and T-580-70-UL (1-1/4” – 3”) or a comparable product by one of the following:

a. Or approved equal.

2. Description:

a. Standard: MSS SP-110, CSA certified and UL/FM listed.
b. CWP Rating: 600 psig.
c. SWP Rating: 150 psig.
d. Gas Rating: 250 psi non-shock LP gas per UL842.
e. Body Design: Two piece with threaded body pack nut design (no threaded stem designs al-lowed) with adjustable stem packing.
f. Body Material: Dezincification-resistant brass.
g. Seats: PTFE
h. Ball: Chrome-plated brass
i. Ends: Threaded
j. Port: Full port (1/2” – 1”), conventional port (1-1/4” – 3”)

B. LPG Shut-Off Cocks, Below Grade:

1. Basis-of-Design Product: Subject to compliance with requirements, provide Nordstom “Poly-Gas” or comparable product by one of the following:

a. Or approved equal.

2. Description:

a. Standards: ASTM D-2513 and ANSI B16.40
b. Valve boxes: cast iron tops marked “GAS”, high-impact heavy-duty ABS valve can as manufactured by C.O. Test Services-VALVCO, Inc. or equal.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine valve interior for cleanliness, freedom from foreign matter, and corrosion. Remove special packing materials, such as blocks, used to prevent disc movement during shipping and handling.

B. Operate valves in positions from fully open to fully closed. Examine guides and seats made accessible by such operations.

C. Examine threads on valve and mating pipe for form and cleanliness.

D. Examine mating flange faces for conditions that might cause leakage. Check bolting for proper size, length, and material. Verify that gasket is of proper size, that its material composition is suitable for service, and that it is free from defects and damage.

E. Do not attempt to repair defective valves; replace with new valves.

3.2 VALVE INSTALLATION

A. Install valves with unions or flanges at each piece of equipment arranged to allow service, maintenance, and equipment removal without system shutdown.

B. Locate valves for easy access and provide separate support where necessary.

C. Install valves in horizontal piping with stem at or above center of pipe.

D. Install valves in position to allow full stem movement.

E. Install check valves for proper direction of flow and as follows:

1. Swing Check Valves: In horizontal position with hinge pin level.
2. Check Valves: In horizontal or vertical position, between flanges.
3. Lift Check Valves: With stem upright and plumb.

3.3 ADJUSTING

A. Adjust or replace valve packing after piping systems have been tested and put into service but before final adjusting and balancing. Replace valves if persistent leaking occurs.

3.4 GENERAL REQUIREMENTS FOR VALVE APPLICATIONS

A. If valve applications are not indicated, use the following:

1. Shutoff Service: Ball, butterfly valves.

2. Butterfly Valve Dead-End Service: Single-flange (lug) type.
3. Throttling Service: Ball or Butterfly valves.

B. If valves with specified SWP classes or CWP ratings are not available, the same types of valves with higher SWP classes or CWP ratings may be substituted.

C. Select valves, except wafer types, with the following end connections:

1. For Copper Tubing, NPS 2 and Smaller: Threaded ends.
2. For Copper Tubing, NPS 2-1/2 to NPS 4: Flanged ends.
3. For Steel Piping, NPS 2 and Smaller: Threaded ends.
4. For Steel Piping, NPS 2-1/2 to NPS 4: Flanged ends.

3.5 DOMESTIC, HOT- AND COLD-WATER VALVE SCHEDULE

A. Pipe NPS 2 and Smaller:

1. Bronze Valves: Threaded ends.
2. Ball Valves: Two piece, full port, bronze with stainless-steel trim.
3. Bronze Lift Check Valves: Class 125, nonmetallic TFE disc.
4. Bronze Swing Check Valves: Class 150, nonmetallic TFE disc.
5. Bronze Gate Valves: Class 150, RS.

B. Pipe NPS 2-1/2 and Larger:

1. Ductile-Iron, Single-Flange Butterfly Valves: 200 CWP, EPDM seat, aluminum-bronze disc.

END OF SECTION 22 05 23

SECTION 22 05 29 - HANGERS AND SUPPORTS FOR PLUMBING PIPING AND EQUIPMENT

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section Includes:

1. Metal pipe hangers and supports.
2. Trapeze pipe hangers.
3. Thermal-hanger shield inserts.
4. Fastener systems.

B. Related Sections:

1. Section 055000 "Metal Fabrications" for structural-steel shapes and plates for trapeze hangers for pipe and equipment supports.

1.3 DEFINITIONS

A. MSS: Manufacturers Standardization Society of The Valve and Fittings Industry Inc.

1.4 PERFORMANCE REQUIREMENTS

A. Delegated Design: Design trapeze pipe hangers and equipment supports, including comprehensive engineering analysis by a qualified professional engineer, using performance requirements and design criteria indicated.

B. Structural Performance: Hangers and supports for plumbing piping and equipment shall withstand the effects of gravity loads and stresses within limits and under conditions indicated according to ASCE/SEI 7.

1. Design supports for multiple pipes, including pipe stands, capable of supporting combined weight of supported systems, system contents, and test water.
2. Design equipment supports capable of supporting combined operating weight of supported equipment and connected systems and components.
3. Design seismic-restraint hangers and supports for piping and equipment and obtain approval from authorities having jurisdiction.

1.5 WORK INCLUDED

A. Furnish all labor, materials, services, testing, transportation and equipment necessary for the completion of all plumbing work as indicated on drawings and specified herein. Work materials

and equipment not indicated or specified which is necessary for the complete and proper operation of the work of this Section in accordance with the true intent and meaning of the contract documents shall be provided and incorporated at no additional cost to the Owner.

1.6 QUALITY ASSURANCE

A. Code Requirements: All work covered by this Section shall conform to the latest requirements of the following regulations:

1. C.C.R., Title 24, Part 5 (2022 CPC).
2. 2022 California Plumbing Code.
3. SMACNA Seismic Restraint Manual Guidelines for Mechanical Systems.
4. National Fire Protection Association.
5. California State Division of Industrial Safety.
6. County Health Department.
7. Any other legally constituted body-having jurisdiction thereof.

B. Nothing in the specifications or drawings shall be construed to permit deviation from the requirements of governing codes unless approval for said deviation has been obtained from the legally constituted authorities having jurisdiction and from the Owner's representative.

1.7 DRAWINGS

A. Because of the small-scale drawings, it is not possible to indicate all offsets, fittings and accessories which may be required. The Contractor shall carefully investigate the conditions surrounding installation of his work, furnishing the necessary piping, fittings, valves, traps, and other devices which may be required to complete the installation.

B. The general arrangement indicated on the drawings shall be followed as closely as possible. Coordinate with the Architectural, Structural, Mechanical and Electrical Drawings and the work of other trades prior to installation of piping fixtures and equipment to verify adequate space available for installation of the work shown. In the event a field condition arises which makes it impossible to install the work as indicated, submit, in writing, the proposed departures to the Architect for his approval. Only when Architect's approval is given, in writing, shall Contractor proceed with installation of the work.

C. Special Note: Should the Contractor make changes in the installation differing from what is indicated on the contract drawings and not necessitated due to field conditions as indicated hereinabove, the Contractor shall be required to re-install the work to comply with what has been indicated on the contract drawings. Should it be impossible to re-install the work and the installation is in accordance with all governing authorities, the architect may permit the installation to remain. However, all costs incurred to revise the contract drawings by the engineer for resubmittal to the building department indicating the as-installed condition shall become the responsibility of the Contractor.

D. In case of a difference in the specifications or between the specifications and the drawings, the Contractor shall figure the most expensive alternate and after award of contract, shall secure direction from the Architect.

1.8 PERMITS, INSPECTIONS AND LICENSES

A. All permits, inspections and licenses required by the legally constituted authorities for installation of the work according to the plans and specifications shall be obtained and paid as a part of the work of this section.

1.9 EXAMINATION OF PREMISES

A. Before bidding on this work, Contractors shall make a careful examination of the premises and shall thoroughly familiarize themselves with the requirements of the contract. By the act of submitting a proposal for the work included in this contract, the Contractor shall be deemed to have made such study and examination, and that he is familiar with and accepts all conditions of the site.

1.10 PROTECTION

A. All work, equipment and materials shall be protected at all times. Contractor shall make good all damage caused either directly or indirectly by his own workmen. Contractor shall also protect his own work from damage. He shall close all pipe openings with caps or plugs during installation. He shall protect all his equipment and materials against dirt, water, chemical and mechanical injury. Upon completion, all work shall be thoroughly cleaned and delivered in a new condition.

B. Contractor shall be held responsible for all damage to equipment and materials until he has received written notice from the Architect or Engineer that his work has been accepted.

1.11 LOCATIONS

A. The locations of apparatus, piping and equipment indicated on the drawings are approximate. Piping and equipment shall be installed in such a manner as to avoid all obstruction, preserve headroom, and keep openings and passages clear. The locations of and mounting heights of all fixtures shall be coordinated with the architectural plans and room elevations.

B. Clearances and Openings: Contractor shall cooperate and coordinate his work with all other trades to avoid conflict and permit for a neat and orderly appearance of the entire installation. The Contractor shall, in advance of the work, furnish instructions to the General Contractor as to his requirements for equipment and material installation of any kind, whether or not specifically mentioned on drawings or in the specifications, and shall include recesses, chases in walls, and all required openings in the structure. Should furnishing this information be neglected, delayed or incorrect and additional cuttings are found to be required, the cost of the same shall be charged to this Contractor.

C. Contractor shall verify and coordinate pipe routing with location of all electrical rooms, elevator equipment rooms, telecom/data rooms, and other rooms dedicated to the housing of switchgear, panels, or other electrical equipment. In no case shall piping be installed within or above the ceiling of such rooms.

1.12 SUBMITTAL DATA

A. Submittal Requirements:

1. Furnish, all at one time, prior to any installation, within the time noted below, six (6) copies of valid submittal data on all fixtures, material, equipment and devices. Each submitted item shall be indexed and referenced to these specifications and to identification numbers on fixtures and equipment schedules.
2. Manufacturers' submittal literature and shop drawings are required on all items to ensure the latest and most complete manufacturer's data is available for review. Requirements of the submittals and Engineer's submittal notes are a part of the work of this Division except that Engineer's notes may not be used as a means of increasing the scope of work of this Division.
3. Submittals will be checked for general conformance with the design concept of the project but the review does not guarantee quantities shown and does not supersede requirements of this Division to properly install work.
4. To be valid, all submittals must:

    a. Be delivered to the Architect's office within thirty-five (35) days of award of the contract. Contractor shall make time allowance for Engineer's review, return of comments, if any, and resubmittal if required. Corrections or changes in submittals returned as inadequate or incomplete shall be accomplished within this time limit.
    b. Clearly indicate and label as such any items proposed as substitution for that specified or shown on plans.
    c. Include all pertinent construction, installation, performance and technical data.
    d. Have all product data sheets clearly labeled to indicate the individual items being submitted. In addition, all required options and accessories shall be clearly marked.

        1) Product data sheets corresponding to items indicated on plans shall be clearly labeled with the corresponding fixture or equipment tag number.
        2) Product data sheets corresponding to items indicated in specifications shall be clearly labeled with the specification section, page and item numbers.

    e. Include, for every item which differs in size, configuration, connections, service, accessibility or any other significant way, a drawing to the same (or larger) scale as to the pertinent portions of the contract drawings. In this drawing show a complete layout of the system except that which is identical to the contract drawings, unless the unchanged portions must be shown to indicate such things as clearances. This drawing, together with the contract design drawings must show the complete system as revised to accommodate the proposed alternate.

B. Substitution Requirements:

1. Any items included in submittals and proposed by the Contractor as substitution for that specified or shown on plans shall be submitted within thirty five (35) days of award of the contract. After such time, proposed substitutions shall not be accepted for review, and the Contractor shall submit all items as specified or shown on plans.

    a. For each item proposed as substitution for that specified or shown on plans, copies of product data sheets for the specified item shall be placed side by side with product data sheets for the proposed substitution item within the submittal.

        1) In addition to the Submittal Requirements for labeling listed above, product data sheets for the specified item shall be clearly labeled "SPECIFIED ITEM, NOT SUBMITTED". Product data sheets for the corresponding proposed substitution item shall be clearly labeled "PROPOSED SUBSTITUTION".

b. Provide calculations and other detailed data justifying how any items proposed as substitution were selected for proposal. Data must be complete enough to permit detailed comparison of every significant characteristic for which the specified item was analyzed during design.

2. It shall be the Contractor's responsibility to provide sufficient information to allow the Engineer to analyze any proposed alternate. If inadequate information is provided, the proposal will not be approved and resubmittal will not be allowed.
3. The Contractor shall provide or perform tests required by Engineer for purpose of judging acceptability of proposed substitutions.
4. The Contractor assumes full responsibility that alternate items and procedures will meet the job requirements and is responsible for cost of redesign and of modifications to this and other parts of work caused by alternate items furnished under work in this Section. In view of these responsibilities, it is the purpose of these specifications to establish procedures to ensure that the Contractor has considered all the ramifications of proposed alternates before submitting them for review. Submittals which do not comply with the requirements of these specifications or which indicate proposed alternates that were selected without proper regard to the requirements of the job will not be approved. No more than one proposed alternate will be considered for each item.
5. Alternate items installed without Engineer's approval will be replaced with specified items at Contractor's expense.
6. The Architect or his authorized representative shall be the sole judge as to the quality and suitability of proposed alternate equipment, fixtures or materials. Decisions of the Architect or that of his representative shall be final and conclusive.

1.13 QUALITY ASSURANCE

A. Structural Steel Welding Qualifications: Qualify procedures and personnel according to AWS D1.1/D1.1M, "Structural Welding Code - Steel."

1.14 UNINSPECTED WORK

A. The Contractor shall not allow or cause any of his work to be covered up or closed in until it has been inspected, tested, approved by all authorities have jurisdiction, and until Project Record drawings have been properly annotated.

B. Should any of his work be covered up or closed in before such inspection, he shall, at his own expense, uncover the work to the satisfaction of the inspection party. All related repair work cost shall be borne by the Contractor.

1.15 RECORD DRAWINGS

A. Contractor shall provide and keep up-to-date a complete "as-built" record set of blueline prints which shall show every change from the original drawings and the exact "as-built" locations and sizes of the work provided under this Section of the specifications. This set shall include locations, dimensions, depth of buried piping, cleanouts, shut-off valves, sewer invert locations, plugged wyes, tees, etc. On completion of the work, the Contractor shall incorporate all as-built information on a set of reproducible tracings provided by the Architect and this set of reproducibles shall be delivered to the Architect.

1.16 GUARANTEES

A. Contractor shall guarantee the entire plumbing and piping systems unconditionally for a period of one (1) year after final acceptance. If, during this period, any materials, equipment, or any part of the systems fail to function properly, the Contractor shall make good the defects promptly and without any expense to the Owner.

B. Contractor shall be responsible for all damage to any part of the premises caused by leaks in pipelines or equipment furnished and installed under this Section for a period of one (1) year after date of acceptance of his work.

C. All equipment and fixtures shall carry manufacturer's warranty against defective parts or poor workmanship for not less than one (1) year. See specific equipment specifications for extended warranty requirements.

PART 2 - PRODUCTS

2.1 PIPE SUPPORTS: Unless otherwise indicated on the drawings, shall be as follows:

A. The Contractor shall furnish and install all miscellaneous iron work including angles, channels, etc., required to appropriately support the various piping systems. Hanger spacing and location shall conform to 2016 California Plumbing Code Table 313.1.

B. All horizontal runs of piping within the building to be supported from the structural framing with steel rods and split ring hangers, B-Line, Grinnell Company, Tolco, or approved equal. Steel rods shall be secured to overhead framing with side beam connectors. Where necessary, install angle iron between framing to accommodate hanger rods. Where several pipes are running together, Unistrut, B-Line or Powerstrut channels with clamps may be used in lieu of individual pipe hangers, and supported from structure as herein specified. Submit test data for type of hanger supports to be provided. For support conditions other than specified herein, the Contractor shall submit method of support for approval prior to any installation.

C. Horizontal Piping Hangers and Supports:

1. General: Provide factory fabricated horizontal hangers and supports complying with one of the following MSS types listed to suit horizontal-piping systems, in accordance with MSS SP-69 and manufacturer's published product information. Select size of hangers and supports to exactly fit pipe size for bare piping, and to exactly fit around piping insulation with saddle or shield for insulated piping. Provide copper-plated hangers and supports for copper-piping systems.

   a. Adjustable Steel Clevis Hangers: (MSS Type 1.) B-Line B 3100
   b. Adjustable Swivel Pipe Rings: (MSS Type 5) B-Line B3690

D. Vertical-Piping Clamps:

1. General: Provide factory fabricated vertical-piping clamps complying with the following types listed, to suit vertical piping systems, in accordance with MSS SP-69 and manufacturer's published product information. Select size of vertical piping clamps to exactly fit pipe size of bare pipe. Provide copper-plated clamps for copper-piping systems.
2. Two-Bolt Riser Clamps: (MSS Type 8) B-Line B3373

E. Hanger-Rod Attachments:

1. General: Provide factory fabricated hanger-rod attachments B-Line, Tolco or approved equal, selected by Installer to suit horizontal-piping hangers and building attachments, in accordance with MSS SP-58 and manufacturer's published product information. Select size of hanger-rod attachment to suit hanger rods. Provide copper-plated hanger-rod attachments for copper-piping systems.
2. Side beam eye socket, Tolco Fig. #57 for rod sizes 3/8" dia. and Tolco Fig. #25-30-251 for rod sizes 1/2" dia.

F. Building Attachments:

1. General: Provide factory fabricated building attachments, selected by Installer to suit building structural framing conditions, in accordance with MSS SP-69 and manufacturer's published product information. Select size of building attachments to suit hanger rods. Provide copper-plated building attachments for copper-piping systems.

G. Hanger Rods and Spacing shall conform to the following table:

Pipe Sizes	Spacing	Rods
2 Inch and Smaller	6 Feet	3/8 Inch
2-1/2 Inch to 3 Inch	8 Feet	1/2 Inch
4 Inch and larger	8 Feet	5/8 Inch

H. Hangers and Supports shall be adequate to maintain alignment and prevent sagging and shall be placed within 18 inches of joint. Support shall be provided at each horizontal branch connection.

I. Provide lateral bracing as manufactured by B-Line or approved equal for all piping to prevent swaying or movement in accordance with SMACNA "Guidelines for Seismic Restraints of Piping Systems". Piping smaller than indicated in the guidelines shall be provided with bracing as specified for the smallest size indicated. The entire water distribution system shall be properly braced and will not move due to the action of quick closing of valves.

J. Miscellaneous Supports, Wall Brackets, Etc.: Provide where required in accordance with the best standard practices of the trade. Submit shop drawings for all fabricated supports.

2.2 ISOLATORS.

A. All piping which is not isolated from contact with the building by its insulation shall be installed with a manufactured type isolator. Isolators shall be B-Line vibra clamp and cushion, Super Strut, Stoneman "Trisolator", or approved equal. Piping shall be installed and supported in a manner to provide for expansion without strains. Guides shall be properly installed to ensure this requirement.

2.3 SHIELDS:

A. General: Provide shields at piping hangers and supports, factory-fabricated, for all insulated piping as manufactured by Pipeshields Incorporated or approved equal. Size shields for exact fit to mate with pipe insulation.

1. Protection Shields: MSS Type 40; provide high density insert of same thickness of insulation or equal 100-psi average compressive strength, waterproofed calcium silicate, encased with a sheet metal shield. Insert and shield shall cover entire circumference of the pipe and shall be of length indicated by manufacturer for pipe size and thickness of insulation.

2.4 METAL PIPE HANGERS AND SUPPORTS

A. Carbon-Steel Pipe Hangers and Supports:

1. Description: MSS SP-58, Types 1 through 58, factory-fabricated components.
2. Galvanized Metallic Coatings: Pregalvanized or hot dipped.
3. Nonmetallic Coatings: Plastic coating, jacket, or liner.
4. Padded Hangers: Hanger with fiberglass or other pipe insulation pad or cushion to support bearing surface of piping.
5. Hanger Rods: Continuous-thread rod, nuts, and washer made of stainless steel.

B. Stainless-Steel Pipe Hangers and Supports:

1. Description: MSS SP-58, Types 1 through 58, factory-fabricated components.
2. Padded Hangers: Hanger with fiberglass or other pipe insulation pad or cushion to support bearing surface of piping.
3. Hanger Rods: Continuous-thread rod, nuts, and washer made of stainless steel.

C. Copper Pipe Hangers:

1. Description: MSS SP-58, Types 1 through 58, copper-coated-steel, factory-fabricated components.
2. Hanger Rods: Continuous-thread rod, nuts, and washer made of stainless steel.

2.5 TRAPEZE PIPE HANGERS

A. Description: MSS SP-69, Type 59, shop- or field-fabricated pipe-support assembly made from structural carbon-steel shapes with MSS SP-58 carbon-steel hanger rods, nuts, saddles, and U-bolts.

2.6 THERMAL-HANGER SHIELD INSERTS

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1. ERICO International Corporation.
2. PHS Industries, Inc.
3. Pipe Shields, Inc.; a subsidiary of Piping Technology & Products, Inc.
4. Piping Technology & Products, Inc.

B. Insulation-Insert Material for Hot Piping: Water-repellent treated, ASTM C 533, Type I calcium silicate with 100-psig ASTM C 552 or Type II cellular glass with 100-psig minimum compressive strength.

C. For Trapeze or Clamped Systems: Insert and shield shall cover entire circumference of pipe.

D. For Clevis or Band Hangers: Insert and shield shall cover lower 180 degrees of pipe.

E. Insert Length: Extend 2 inches beyond sheet metal shield for piping operating below ambient air temperature.

2.7 FASTENER SYSTEMS

A. Powder-Actuated Fasteners: Threaded-steel stud, for use in hardened portland cement concrete with pull-out, tension, and shear capacities appropriate for supported loads and building materials where used.

B. Mechanical-Expansion Anchors: Insert-wedge-type, stainless- steel anchors, for use in hardened portland cement concrete; with pull-out, tension, and shear capacities appropriate for supported loads and building materials where used.

2.8 MISCELLANEOUS MATERIALS

A. Structural Steel: ASTM A 36/A 36M, carbon-steel plates, shapes, and bars; black and galvanized.

B. Grout: ASTM C 1107, factory-mixed and -packaged, dry, hydraulic-cement, nonshrink and nonmetallic grout; suitable for interior and exterior applications.

1. Properties: Nonstaining, noncorrosive, and nongaseous.
2. Design Mix: 5000-psi, 28-day compressive strength.

PART 3 - EXECUTION

3.1 HANGER AND SUPPORT INSTALLATION

A. Metal Pipe-Hanger Installation: Comply with MSS SP-69 and MSS SP-89. Install hangers, supports, clamps, and attachments as required to properly support piping from the building structure.

B. Metal Trapeze Pipe-Hanger Installation: Comply with MSS SP-69 and MSS SP-89. Arrange for grouping of parallel runs of horizontal piping, and support together on field-fabricated trapeze pipe hangers.

1. Pipes of Various Sizes: Support together and space trapezes for smallest pipe size or install intermediate supports for smaller diameter pipes as specified for individual pipe hangers.
2. Field fabricate from ASTM A 36/A 36M, carbon-steel shapes selected for loads being supported. Weld steel according to AWS D1.1/D1.1M.

C. Thermal-Hanger Shield Installation: Install in pipe hanger or shield for insulated piping.

D. Fastener System Installation:

1. Install powder-actuated fasteners for use in lightweight concrete or concrete slabs less than 4 inches thick in concrete after concrete is placed and completely cured. Use

operators that are licensed by powder-actuated tool manufacturer. Install fasteners according to powder-actuated tool manufacturer's operating manual.

2. Install mechanical-expansion anchors in concrete after concrete is placed and completely cured. Install fasteners according to manufacturer's written instructions.

E. Install hangers and supports complete with necessary attachments, inserts, bolts, rods, nuts, washers, and other accessories.

F. Equipment Support Installation: Fabricate from welded-structural-steel shapes.

G. Install hangers and supports to allow controlled thermal and seismic movement of piping systems, to permit freedom of movement between pipe anchors, and to facilitate action of expansion joints, expansion loops, expansion bends, and similar units.

H. Install lateral bracing with pipe hangers and supports to prevent swaying.

I. Install building attachments within concrete slabs or attach to structural steel. Install additional attachments at concentrated loads, including valves, flanges, and strainers, NPS 2-1/2 and larger and at changes in direction of piping. Install concrete inserts before concrete is placed; fasten inserts to forms and install reinforcing bars through openings at top of inserts.

J. Load Distribution: Install hangers and supports so that piping live and dead loads and stresses from movement will not be transmitted to connected equipment.

K. Pipe Slopes: Install hangers and supports to provide indicated pipe slopes and to not exceed maximum pipe deflections allowed by ASME B31.9 for building services piping.

L. Insulated Piping:

1. Attach clamps and spacers to piping.

   a. Piping Operating above Ambient Air Temperature: Clamp may project through insulation.
   b. Piping Operating below Ambient Air Temperature: Use thermal-hanger shield insert with clamp sized to match OD of insert.
   c. Do not exceed pipe stress limits allowed by ASME B31.9 for building services piping.

2. Install MSS SP-58, Type 39, protection saddles if insulation without vapor barrier is indicated. Fill interior voids with insulation that matches adjoining insulation.

   a. Option: Thermal-hanger shield inserts may be used. Include steel weight-distribution plate for pipe NPS 4 and larger if pipe is installed on rollers.

3. Shield Dimensions for Pipe: Not less than the following:

   a. NPS 1/4 to NPS 3-1/2: 12 inches long and 0.048 inch thick.
   b. NPS 4: 12 inches long and 0.06 inch thick.

4. Pipes NPS 8 and Larger: Include wood or reinforced calcium-silicate-insulation inserts of length at least as long as protective shield.
5. Thermal-Hanger Shields: Install with insulation same thickness as piping insulation.

3.2 EQUIPMENT SUPPORTS

A. Fabricate structural-steel stands to suspend equipment from structure overhead or to support equipment above floor.

B. Grouting: Place grout under supports for equipment and make bearing surface smooth.

C. Provide lateral bracing, to prevent swaying, for equipment supports.

3.3 METAL FABRICATIONS

A. Cut, drill, and fit miscellaneous metal fabrications for trapeze pipe hangers.

B. Fit exposed connections together to form hairline joints. Field weld connections that cannot be shop welded because of shipping size limitations.

C. Field Welding: Comply with AWS D1.1/D1.1M procedures for shielded, metal arc welding; appearance and quality of welds; and methods used in correcting welding work; and with the following:

1. Use materials and methods that minimize distortion and develop strength and corrosion resistance of base metals.
2. Obtain fusion without undercut or overlap.
3. Remove welding flux immediately.
4. Finish welds at exposed connections so no roughness shows after finishing and so contours of welded surfaces match adjacent contours.

3.4 ADJUSTING

A. Hanger Adjustments: Adjust hangers to distribute loads equally on attachments and to achieve indicated slope of pipe.

B. Trim excess length of continuous-thread hanger and support rods to 1-1/2 inches.

3.5 PAINTING

A. Touchup: Clean field welds and abraded areas of shop paint. Paint exposed areas immediately after erecting hangers and supports. Use same materials as used for shop painting. Comply with SSPC-PA 1 requirements for touching up field-painted surfaces.

1. Apply paint by brush or spray to provide a minimum dry film thickness of 2.0 mils.

B. Touchup: Cleaning and touchup painting of field welds, bolted connections, and abraded areas of shop paint on miscellaneous metal are specified in Section 099123 "Interior Painting."

C. Galvanized Surfaces: Clean welds, bolted connections, and abraded areas and apply galvanizing-repair paint to comply with ASTM A 780.

3.6 HANGER AND SUPPORT SCHEDULE

A. Specific hanger and support requirements are in Sections specifying piping systems and equipment.

B. Comply with MSS SP-69 for pipe-hanger selections and applications that are not specified in piping system Sections.

C. Use hangers and supports with galvanized metallic coatings for piping and equipment that will not have field-applied finish.

D. Use nonmetallic coatings on attachments for electrolytic protection where attachments are in direct contact with copper tubing.

E. Use carbon-steel pipe hangers and supports metal trapeze pipe hangers and attachments for general service applications.

F. Use stainless-steel pipe hangers and stainless-steel attachments for hostile environment applications.

G. Use copper-plated pipe hangers and copper or stainless-steel attachments for copper piping and tubing.

H. Use thermal-hanger shield inserts for insulated piping and tubing.

I. Horizontal-Piping Hangers and Supports: Unless otherwise indicated and except as specified in piping system Sections, install the following types:

1. Adjustable, Steel Clevis Hangers (MSS Type 1): For suspension of noninsulated or insulated, stationary pipes NPS 1/2 to NPS 30.
2. Pipe Hangers (MSS Type 5): For suspension of pipes NPS 1/2 to NPS 4, to allow off-center closure for hanger installation before pipe erection.

J. Vertical-Piping Clamps: Unless otherwise indicated and except as specified in piping system Sections, install the following types:

1. Extension Pipe or Riser Clamps (MSS Type 8): For support of pipe risers NPS 3/4 to NPS 24.

K. Hanger-Rod Attachments: Unless otherwise indicated and except as specified in piping system Sections, install the following types:

1. Steel Turnbuckles (MSS Type 13): For adjustment up to 6 inches for heavy loads.
2. Steel Clevises (MSS Type 14): For 120 to 450 deg F piping installations.
3. Malleable-Iron Sockets (MSS Type 16): For attaching hanger rods to various types of building attachments.
4. Steel Weldless Eye Nuts (MSS Type 17): For 120 to 450 deg F piping installations.

L. Building Attachments: Unless otherwise indicated and except as specified in piping system Sections, install the following types:

1. Steel or Malleable Concrete Inserts (MSS Type 18): For upper attachment to suspend pipe hangers from concrete ceiling.
2. Top-Beam C-Clamps (MSS Type 19): For use under roof installations with bar-joist construction, to attach to top flange of structural shape.

3. Side-Beam or Channel Clamps (MSS Type 20): For attaching to bottom flange of beams, channels, or angles.
4. Center-Beam Clamps (MSS Type 21): For attaching to center of bottom flange of beams.
5. C-Clamps (MSS Type 23): For structural shapes.
6. Top-Beam Clamps (MSS Type 25): For top of beams if hanger rod is required tangent to flange edge.
7. Side-Beam Clamps (MSS Type 27): For bottom of steel I-beams.
8. Steel-Beam Clamps with Eye Nuts (MSS Type 28): For attaching to bottom of steel I-beams for heavy loads.Side-Beam Brackets (MSS Type 34): For sides of steel or wooden beams.
9. Horizontal Travelers (MSS Type 58): For supporting piping systems subject to linear horizontal movement where headroom is limited.

M. Saddles and Shields: Unless otherwise indicated and except as specified in piping system Sections, install the following types:
1. Protection Shields (MSS Type 40): Of length recommended in writing by manufacturer to prevent crushing insulation.
2. Thermal-Hanger Shield Inserts: For supporting insulated pipe.

N. Comply with MSS SP-69 for trapeze pipe-hanger selections and applications that are not specified in piping system Sections.

O. Use powder-actuated fasteners or mechanical-expansion anchors instead of building attachments where required in concrete construction.

END OF SECTION 22 05 29

SECTION 22 05 53 - IDENITIFICATION FOR PLUMBING PIPING AND EQUIPMENT

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section Includes:

1. Equipment labels.
2. Warning signs and labels.
3. Pipe labels.
4. Valve tags.
5. Warning tags.

1.3 WORK INCLUDED

A. Furnish all labor, materials, services, testing, transportation and equipment necessary for the completion of all plumbing work as indicated on drawings and specified herein. Work materials and equipment not indicated or specified which is necessary for the complete and proper operation of the work of this Section in accordance with the true intent and meaning of the contract documents shall be provided and incorporated at no additional cost to the Owner.

1.4 QUALITY ASSURANCE

A. Code Requirements: All work covered by this Section shall conform to the latest requirements of the following regulations:

1. C.C.R., Title 24, Part 5 (2022 CPC).
2. 2022 California Plumbing Code.
3. SMACNA Seismic Restraint Manual Guidelines for Mechanical Systems.
4. National Fire Protection Association.
5. California State Division of Industrial Safety.
6. County Health Department.
7. Any other legally constituted body-having jurisdiction thereof.

B. Nothing in the specifications or drawings shall be construed to permit deviation from the requirements of governing codes unless approval for said deviation has been obtained from the legally constituted authorities having jurisdiction and from the Owner's representative.

1.5 DRAWINGS

A. Because of the small-scale drawings, it is not possible to indicate all offsets, fittings and accessories which may be required. The Contractor shall carefully investigate the conditions surrounding installation of his work, furnishing the necessary piping, fittings, valves, traps, and other devices which may be required to complete the installation.

B. The general arrangement indicated on the drawings shall be followed as closely as possible. Coordinate with the Architectural, Structural, Mechanical and Electrical Drawings and the work of other trades prior to installation of piping fixtures and equipment to verify adequate space available for installation of the work shown. In the event a field condition arises which makes it impossible to install the work as indicated, submit, in writing, the proposed departures to the Architect for his approval. Only when Architect's approval is given, in writing, shall Contractor proceed with installation of the work.

C. Special Note: Should the Contractor make changes in the installation differing from what is indicated on the contract drawings and not necessitated due to field conditions as indicated hereinabove, the Contractor shall be required to re-install the work to comply with what has been indicated on the contract drawings. Should it be impossible to re-install the work and the installation is in accordance with all governing authorities, the architect may permit the installation to remain. However, all costs incurred to revise the contract drawings by the engineer for resubmittal to the building department indicating the as-installed condition shall become the responsibility of the Contractor.

D. In case of a difference in the specifications or between the specifications and the drawings, the Contractor shall figure the most expensive alternate and after award of contract, shall secure direction from the Architect.

1.6 PERMITS, INSPECTIONS AND LICENSES

A. All permits, inspections and licenses required by the legally constituted authorities for installation of the work according to the plans and specifications shall be obtained and paid as a part of the work of this section.

1.7 EXAMINATION OF PREMISES

A. Before bidding on this work, Contractors shall make a careful examination of the premises and shall thoroughly familiarize themselves with the requirements of the contract. By the act of submitting a proposal for the work included in this contract, the Contractor shall be deemed to have made such study and examination, and that he is familiar with and accepts all conditions of the site.

1.8 PROTECTION

A. All work, equipment and materials shall be protected at all times. Contractor shall make good all damage caused either directly or indirectly by his own workmen. Contractor shall also protect his own work from damage. He shall close all pipe openings with caps or plugs during installation. He shall protect all his equipment and materials against dirt, water, chemical and mechanical injury. Upon completion, all work shall be thoroughly cleaned and delivered in a new condition.

B. Contractor shall be held responsible for all damage to equipment and materials until he has received written notice from the Architect or Engineer that his work has been accepted.

1.9 LOCATIONS

A. The locations of apparatus, piping and equipment indicated on the drawings are approximate. Piping and equipment shall be installed in such a manner as to avoid all obstruction, preserve headroom, and keep openings and passages clear. The locations of and mounting heights of all fixtures shall be coordinated with the architectural plans and room elevations.

B. Clearances and Openings: Contractor shall cooperate and coordinate his work with all other trades to avoid conflict and permit for a neat and orderly appearance of the entire installation. The Contractor shall, in advance of the work, furnish instructions to the General Contractor as to his requirements for equipment and material installation of any kind, whether or not specifically mentioned on drawings or in the specifications, and shall include recesses, chases in walls, and all required openings in the structure. Should furnishing this information be neglected, delayed or incorrect and additional cuttings are found to be required, the cost of the same shall be charged to this Contractor.

C. Contractor shall verify and coordinate pipe routing with location of all electrical rooms, elevator equipment rooms, telecom/data rooms, and other rooms dedicated to the housing of switchgear, panels, or other electrical equipment. In no case shall piping be installed within or above the ceiling of such rooms.

1.10 SUBMITTAL DATA

A. Product Data: For each type of product indicated.

B. Samples: For color, letter style, and graphic representation required for each identification material and device.

C. Equipment Label Schedule: Include a listing of all equipment to be labeled with the proposed content for each label.

D. Valve numbering scheme.

E. Valve Schedules: For each piping system to include in maintenance manuals.

F. Submittal Requirements:

1. Furnish, all at one time, prior to any installation, within the time noted below, six (6) copies of valid submittal data on all fixtures, material, equipment and devices. Each submitted item shall be indexed and referenced to these specifications and to identification numbers on fixtures and equipment schedules.
2. Manufacturers' submittal literature and shop drawings are required on all items to ensure the latest and most complete manufacturer's data is available for review. Requirements of the submittals and Engineer's submittal notes are a part of the work of this Division except that Engineer's notes may not be used as a means of increasing the scope of work of this Division.
3. Submittals will be checked for general conformance with the design concept of the project but the review does not guarantee quantities shown and does not supersede requirements of this Division to properly install work.

4. To be valid, all submittals must:

   a. Be delivered to the Architect's office within thirty-five (35) days of award of the contract. Contractor shall make time allowance for Engineer's review, return of comments, if any, and resubmittal if required. Corrections or changes in submittals returned as inadequate or incomplete shall be accomplished within this time limit.
   b. Clearly indicate and label as such any items proposed as substitution for that specified or shown on plans.
   c. Include all pertinent construction, installation, performance and technical data.
   d. Have all product data sheets clearly labeled to indicate the individual items being submitted. In addition, all required options and accessories shall be clearly marked.

      1) Product data sheets corresponding to items indicated on plans shall be clearly labeled with the corresponding fixture or equipment tag number.
      2) Product data sheets corresponding to items indicated in specifications shall be clearly labeled with the specification section, page and item numbers.

   e. Include, for every item which differs in size, configuration, connections, service, accessibility or any other significant way, a drawing to the same (or larger) scale as to the pertinent portions of the contract drawings. In this drawing show a complete layout of the system except that which is identical to the contract drawings, unless the unchanged portions must be shown to indicate such things as clearances. This drawing, together with the contract design drawings must show the complete system as revised to accommodate the proposed alternate.

G. Substitution Requirements:

1. Any items included in submittals and proposed by the Contractor as substitution for that specified or shown on plans shall be submitted within thirty five (35) days of award of the contract. After such time, proposed substitutions shall not be accepted for review, and the Contractor shall submit all items as specified or shown on plans.

   a. For each item proposed as substitution for that specified or shown on plans, copies of product data sheets for the specified item shall be placed side by side with product data sheets for the proposed substitution item within the submittal.

      1) In addition to the Submittal Requirements for labeling listed above, product data sheets for the specified item shall be clearly labeled "SPECIFIED ITEM, NOT SUBMITTED". Product data sheets for the corresponding proposed substitution item shall be clearly labeled "PROPOSED SUBSTITUTION".

   b. Provide calculations and other detailed data justifying how any items proposed as substitution were selected for proposal. Data must be complete enough to permit detailed comparison of every significant characteristic for which the specified item was analyzed during design.

2. It shall be the Contractor's responsibility to provide sufficient information to allow the Engineer to analyze any proposed alternate. If inadequate information is provided, the proposal will not be approved and resubmittal will not be allowed.
3. The Contractor shall provide or perform tests required by Engineer for purpose of judging acceptability of proposed substitutions.

4. The Contractor assumes full responsibility that alternate items and procedures will meet the job requirements and is responsible for cost of redesign and of modifications to this and other parts of work caused by alternate items furnished under work in this Section. In view of these responsibilities, it is the purpose of these specifications to establish procedures to ensure that the Contractor has considered all the ramifications of proposed alternates before submitting them for review. Submittals which do not comply with the requirements of these specifications or which indicate proposed alternates that were selected without proper regard to the requirements of the job will not be approved. No more than one proposed alternate will be considered for each item.
5. Alternate items installed without Engineer's approval will be replaced with specified items at Contractor's expense.
6. The Architect or his authorized representative shall be the sole judge as to the quality and suitability of proposed alternate equipment, fixtures or materials. Decisions of the Architect or that of his representative shall be final and conclusive.

1.11 COORDINATION

A. Coordinate installation of identifying devices with completion of covering and painting of surfaces where devices are to be applied.

B. Coordinate installation of identifying devices with locations of access panels and doors.

C. Install identifying devices before installing acoustical ceilings and similar concealment.

1.12 UNINSPECTED WORK

A. The Contractor shall not allow or cause any of his work to be covered up or closed in until it has been inspected, tested, approved by all authorities have jurisdiction, and until Project Record drawings have been properly annotated.

B. Should any of his work be covered up or closed in before such inspection, he shall, at his own expense, uncover the work to the satisfaction of the inspection party. All related repair work cost shall be borne by the Contractor.

1.13 RECORD DRAWINGS (Also see General Conditions)

A. Contractor shall provide and keep up-to-date a complete "as-built" record set of blueline prints which shall show every change from the original drawings and the exact "as-built" locations and sizes of the work provided under this Section of the specifications. This set shall include locations, dimensions, depth of buried piping, cleanouts, shut-off valves, sewer invert locations, plugged wyes, tees, etc. On completion of the work, the Contractor shall incorporate all as-built information on a set of reproducible tracings provided by the Architect and this set of reproducibles shall be delivered to the Architect.

1.14 GUARANTEES

A. Contractor shall guarantee the entire plumbing and piping systems unconditionally for a period of one (1) year after final acceptance. If, during this period, any materials, equipment, or any part of the systems fail to function properly, the Contractor shall make good the defects promptly and without any expense to the Owner.

B. Contractor shall be responsible for all damage to any part of the premises caused by leaks in pipelines or equipment furnished and installed under this Section for a period of one (1) year after date of acceptance of his work.

C. All equipment and fixtures shall carry manufacturer's warranty against defective parts or poor workmanship for not less than one (1) year. See specific equipment specifications for extended warranty requirements.

PART 2 - PRODUCTS

2.1 EQUIPMENT LABELS

A. Metal Labels for Equipment:

1. Material and Thickness: Brass, 0.032-inch minimum thickness, and having predrilled or stamped holes for attachment hardware.
2. Minimum Label Size: Length and width vary for required label content, but not less than 2-1/2 by 3/4 inch.
3. Minimum Letter Size: 1/4 inch for name of units if viewing distance is less than 24 inches, 1/2 inch for viewing distances up to 72 inches, and proportionately larger lettering for greater viewing distances. Include secondary lettering two-thirds to three-fourths the size of principal lettering.
4. Fasteners: Stainless-steel rivets or self-tapping screws.
5. Adhesive: Contact-type permanent adhesive, compatible with label and with substrate.

B. Label Content: Include equipment's Drawing designation or unique equipment number, Drawing numbers where equipment is indicated (plans, details, and schedules), plus the Specification Section number and title where equipment is specified.

C. Equipment Label Schedule: For each item of equipment to be labeled, on 8-1/2-by-11-inch bond paper. Tabulate equipment identification number and identify Drawing numbers where equipment is indicated (plans, details, and schedules), plus the Specification Section number and title where equipment is specified. Equipment schedule shall be included in operation and maintenance data.

2.2 WARNING SIGNS AND LABELS

A. Material and Thickness: Multilayer, multicolor, plastic labels for mechanical engraving, 1/8 inch thick, and having predrilled holes for attachment hardware.

B. Letter Color: Black.

C. Background Color: White.

D. Maximum Temperature: Able to withstand temperatures up to 160 deg F.

E. Minimum Label Size: Length and width vary for required label content, but not less than 2-1/2 by 3/4 inch.

F. Minimum Letter Size: 1/4 inch for name of units if viewing distance is less than 24 inches, 1/2 inch for viewing distances up to 72 inches, and proportionately larger lettering for greater

viewing distances. Include secondary lettering two-thirds to three-fourths the size of principal lettering.

G. Adhesive: Contact-type permanent adhesive, compatible with label and with substrate.

H. Label Content: Include caution and warning information, plus emergency notification instructions.

2.3 PIPE LABELS

A. General Requirements for Manufactured Pipe Labels: Preprinted, color-coded, with lettering indicating service, and showing flow direction.

B. Pretensioned Pipe Labels: Precoiled, semirigid plastic formed to cover full circumference of pipe and to attach to pipe without fasteners or adhesive.

C. Self-Adhesive Pipe Labels: Printed plastic with contact-type, permanent-adhesive backing.

D. Pipe Label Contents: Include identification of piping service using same designations or abbreviations as used on Drawings, pipe size, and an arrow indicating flow direction.

1. Flow-Direction Arrows: Integral with piping system service lettering to accommodate both directions, or as separate unit on each pipe label to indicate flow direction.
2. Lettering Size: At least 1-1/2 incheshigh.

2.4 VALVE TAGS

A. Valve Tags: Stamped or engraved with 1/4-inch letters for piping system abbreviation and 1/2-inch numbers.

1. Tag Material: Brass, 0.032-inch minimum thickness, and having predrilled or stamped holes for attachment hardware.
2. Fasteners: Brass wire-link or beaded chain; or S-hook.

B. Valve Schedules: For each piping system, on 8-1/2-by-11-inch bond paper. Tabulate valve number, piping system, system abbreviation (as shown on valve tag), location of valve (room or space), normal-operating position (open, closed, or modulating), and variations for identification. Mark valves for emergency shutoff and similar special uses.

1. Valve-tag schedule shall be included in operation and maintenance data.

2.5 WARNING TAGS

A. Warning Tags: Preprinted or partially preprinted, accident-prevention tags, of plasticized card stock with matte finish suitable for writing.

1. Size: 3 by 5-1/4 inches minimum.
2. Fasteners: Brass grommet and wire.
3. Nomenclature: Large-size primary caption such as "DANGER," "CAUTION," or "DO NOT OPERATE."
4. Color: Yellow background with black lettering.

PART 3 - EXECUTION

3.1 PREPARATION

A. Clean piping and equipment surfaces of substances that could impair bond of identification devices, including dirt, oil, grease, release agents, and incompatible primers, paints, and encapsulants.

3.2 EQUIPMENT LABEL INSTALLATION

A. Install or permanently fasten labels on each major item of mechanical equipment.

B. Locate equipment labels where accessible and visible.

3.3 PIPE LABEL INSTALLATION

A. Piping Color-Coding: Painting of piping is specified in Section 099123 "Interior Painting."

B. Stenciled Pipe Label Option: Stenciled labels may be provided instead of manufactured pipe labels, at Installer's option. Install stenciled pipe labels with painted, color-coded bands or rectangles on each piping system.

1. Identification Paint: Use for contrasting background.
2. Stencil Paint: Use for pipe marking.

C. Locate pipe labels where piping is exposed or above accessible ceilings in finished spaces; machine rooms; accessible maintenance spaces such as shafts, tunnels, and plenums; and exterior exposed locations as follows:

1. Near each valve and control device.
2. Near each branch connection, excluding short takeoffs for fixtures and terminal units. Where flow pattern is not obvious, mark each pipe at branch.
3. Near penetrations through walls, floors, ceilings, and inaccessible enclosures.
4. At access doors, manholes, and similar access points that permit view of concealed piping.
5. Near major equipment items and other points of origination and termination.
6. Spaced at maximum intervals of 50 feet along each run. Reduce intervals to 25 feet in areas of congested piping and equipment.
7. On piping above removable acoustical ceilings. Omit intermediately spaced labels.

D. Pipe Label Color Schedule:

1. Domestic Water Piping:

   a. Background Color: White.
   b. Letter Color: Black.

2. Sanitary Waste and Storm Drainage Piping:

   a. Background Color: White.
   b. Letter Color: Black.

3.4 VALVE-TAG INSTALLATION

A. Install tags on valves and control devices in piping systems, except check valves; valves within factory-fabricated equipment units; shutoff valves; faucets; convenience and lawn-watering hose connections; and similar roughing-in connections of end-use fixtures and units. List tagged valves in a valve schedule.

B. Valve-Tag Application Schedule: Tag valves according to size, shape, and color scheme and with captions similar to those indicated in the following subparagraphs:

1. Valve-Tag Size and Shape:

   a. Cold Water: 1-1/2 inches, round.
   b. Hot Water: 1-1/2 inches, round.

2. Valve-Tag Color:

   a. Cold Water: Natural.
   b. Hot Water: Natural.

3. Letter Color:

   a. Cold Water: Black.
   b. Hot Water: Black.

3.5 WARNING-TAG INSTALLATION

A. Write required message on, and attach warning tags to, equipment and other items where required.

END OF SECTION 22 05 53

SECTION 22 07 19 - PLUMBING PIPING INSULATION

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section includes insulating the following plumbing piping services:

1. Domestic cold-water piping.
2. Domestic hot-water piping.
3. Supplies and drains for handicap-accessible lavatories and sinks.

B. Related Sections:

1. Section 220716 "Plumbing Equipment Insulation."

1.3 WORK INCLUDED

A. Furnish all labor, materials, services, testing, transportation and equipment necessary for the completion of all plumbing work as indicated on drawings and specified herein. Work materials and equipment not indicated or specified which is necessary for the complete and proper operation of the work of this Section in accordance with the true intent and meaning of the contract documents shall be provided and incorporated at no additional cost to the Owner.

1.4 QUALITY ASSURANCE

A. Code Requirements: All work covered by this Section shall conform to the latest requirements of the following regulations:

1. C.C.R., Title 24, Part 5 (2022 CPC).
2. 2022 California Plumbing Code.
3. SMACNA Seismic Restraint Manual Guidelines for Mechanical Systems.
4. National Fire Protection Association.
5. California State Division of Industrial Safety.
6. County Health Department.
7. Any other legally constituted body-having jurisdiction thereof.

B. Nothing in the specifications or drawings shall be construed to permit deviation from the requirements of governing codes unless approval for said deviation has been obtained from the legally constituted authorities having jurisdiction and from the Owner's representative.

1.5 DRAWINGS

A. Because of the small-scale drawings, it is not possible to indicate all offsets, fittings and accessories which may be required. The Contractor shall carefully investigate the conditions surrounding installation of his work, furnishing the necessary piping, fittings, valves, traps, and other devices which may be required to complete the installation.

B. The general arrangement indicated on the drawings shall be followed as closely as possible. Coordinate with the Architectural, Structural, Mechanical and Electrical Drawings and the work of other trades prior to installation of piping fixtures and equipment to verify adequate space available for installation of the work shown. In the event a field condition arises which makes it impossible to install the work as indicated, submit, in writing, the proposed departures to the Architect for his approval. Only when Architect's approval is given, in writing, shall Contractor proceed with installation of the work.

C. Special Note: Should the Contractor make changes in the installation differing from what is indicated on the contract drawings and not necessitated due to field conditions as indicated hereinabove, the Contractor shall be required to re-install the work to comply with what has been indicated on the contract drawings. Should it be impossible to re-install the work and the installation is in accordance with all governing authorities, the architect may permit the installation to remain. However, all costs incurred to revise the contract drawings by the engineer for resubmittal to the building department indicating the as-installed condition shall become the responsibility of the Contractor.

D. In case of a difference in the specifications or between the specifications and the drawings, the Contractor shall figure the most expensive alternate and after award of contract, shall secure direction from the Architect.

1.6 PERMITS, INSPECTIONS AND LICENSES

A. All permits, inspections and licenses required by the legally constituted authorities for installation of the work according to the plans and specifications shall be obtained and paid as a part of the work of this section.

1.7 EXAMINATION OF PREMISES

A. Before bidding on this work, Contractors shall make a careful examination of the premises and shall thoroughly familiarize themselves with the requirements of the contract. By the act of submitting a proposal for the work included in this contract, the Contractor shall be deemed to have made such study and examination, and that he is familiar with and accepts all conditions of the site.

1.8 PROTECTION

A. All work, equipment and materials shall be protected at all times. Contractor shall make good all damage caused either directly or indirectly by his own workmen. Contractor shall also protect his own work from damage. He shall close all pipe openings with caps or plugs during installation. He shall protect all his equipment and materials against dirt, water, chemical and mechanical injury. Upon completion, all work shall be thoroughly cleaned and delivered in a new condition.

B. Contractor shall be held responsible for all damage to equipment and materials until he has received written notice from the Architect or Engineer that his work has been accepted.

1.9 LOCATIONS

A. The locations of apparatus, piping and equipment indicated on the drawings are approximate. Piping and equipment shall be installed in such a manner as to avoid all obstruction, preserve headroom, and keep openings and passages clear. The locations of and mounting heights of all fixtures shall be coordinated with the architectural plans and room elevations.

B. Clearances and Openings: Contractor shall cooperate and coordinate his work with all other trades to avoid conflict and permit for a neat and orderly appearance of the entire installation. The Contractor shall, in advance of the work, furnish instructions to the General Contractor as to his requirements for equipment and material installation of any kind, whether or not specifically mentioned on drawings or in the specifications, and shall include recesses, chases in walls, and all required openings in the structure. Should furnishing this information be neglected, delayed or incorrect and additional cuttings are found to be required, the cost of the same shall be charged to this Contractor.

C. Contractor shall verify and coordinate pipe routing with location of all electrical rooms, elevator equipment rooms, telecom/data rooms, and other rooms dedicated to the housing of switchgear, panels, or other electrical equipment. In no case shall piping be installed within or above the ceiling of such rooms.

1.10 SUBMITTAL DATA

A. Submittal Requirements:

1. Furnish, all at one time, prior to any installation, within the time noted below, six (6) copies of valid submittal data on all fixtures, material, equipment and devices. Each submitted item shall be indexed and referenced to these specifications and to identification numbers on fixtures and equipment schedules.
2. Manufacturers' submittal literature and shop drawings are required on all items to ensure the latest and most complete manufacturer's data is available for review. Requirements of the submittals and Engineer's submittal notes are a part of the work of this Division except that Engineer's notes may not be used as a means of increasing the scope of work of this Division.
3. Submittals will be checked for general conformance with the design concept of the project but the review does not guarantee quantities shown and does not supersede requirements of this Division to properly install work.
4. To be valid, all submittals must:

    a. Be delivered to the Architect's office within thirty-five (35) days of award of the contract. Contractor shall make time allowance for Engineer's review, return of comments, if any, and resubmittal if required. Corrections or changes in submittals returned as inadequate or incomplete shall be accomplished within this time limit.
    b. Clearly indicate and label as such any items proposed as substitution for that specified or shown on plans.
    c. Include all pertinent construction, installation, performance and technical data.
    d. Have all product data sheets clearly labeled to indicate the individual items being submitted. In addition, all required options and accessories shall be clearly marked.

1) Product data sheets corresponding to items indicated on plans shall be clearly labeled with the corresponding fixture or equipment tag number.
2) Product data sheets corresponding to items indicated in specifications shall be clearly labeled with the specification section, page and item numbers.

e. Include, for every item which differs in size, configuration, connections, service, accessibility or any other significant way, a drawing to the same (or larger) scale as to the pertinent portions of the contract drawings. In this drawing show a complete layout of the system except that which is identical to the contract drawings, unless the unchanged portions must be shown to indicate such things as clearances. This drawing, together with the contract design drawings must show the complete system as revised to accommodate the proposed alternate.

B. Substitution Requirements:

1. Any items included in submittals and proposed by the Contractor as substitution for that specified or shown on plans shall be submitted within thirty five (35) days of award of the contract. After such time, proposed substitutions shall not be accepted for review, and the Contractor shall submit all items as specified or shown on plans.

a. For each item proposed as substitution for that specified or shown on plans, copies of product data sheets for the specified item shall be placed side by side with product data sheets for the proposed substitution item within the submittal.

1) In addition to the Submittal Requirements for labeling listed above, product data sheets for the specified item shall be clearly labeled “SPECIFIED ITEM, NOT SUBMITTED”. Product data sheets for the corresponding proposed substitution item shall be clearly labeled “PROPOSED SUBSTITUTION”.

b. Provide calculations and other detailed data justifying how any items proposed as substitution were selected for proposal. Data must be complete enough to permit detailed comparison of every significant characteristic for which the specified item was analyzed during design.

2. It shall be the Contractor’s responsibility to provide sufficient information to allow the Engineer to analyze any proposed alternate. If inadequate information is provided, the proposal will not be approved and resubmittal will not be allowed.
3. The Contractor shall provide or perform tests required by Engineer for purpose of judging acceptability of proposed substitutions.
4. The Contractor assumes full responsibility that alternate items and procedures will meet the job requirements and is responsible for cost of redesign and of modifications to this and other parts of work caused by alternate items furnished under work in this Section. In view of these responsibilities, it is the purpose of these specifications to establish procedures to ensure that the Contractor has considered all the ramifications of proposed alternates before submitting them for review. Submittals which do not comply with the requirements of these specifications or which indicate proposed alternates that were selected without proper regard to the requirements of the job will not be approved. No more than one proposed alternate will be considered for each item.
5. Alternate items installed without Engineer's approval will be replaced with specified items at Contractor's expense.

1.11 INFORMATIONAL SUBMITTALS

A. Qualification Data: For qualified Installer.

B. Material Test Reports: From a qualified testing agency acceptable to authorities having jurisdiction indicating, interpreting, and certifying test results for compliance of insulation materials, sealers, attachments, cements, and jackets, with requirements indicated. Include dates of tests and test methods employed.

C. Field quality-control reports.

1.12 QUALITY ASSURANCE

A. Installer Qualifications: Skilled mechanics who have successfully completed an apprenticeship program or another craft training program certified by the Department of Labor, Bureau of Apprenticeship and Training.

B. Surface-Burning Characteristics: For insulation and related materials, as determined by testing identical products according to ASTM E 84 by a testing agency acceptable to authorities having jurisdiction. Factory label insulation and jacket materials and adhesive, mastic, tapes, and cement material containers, with appropriate markings of applicable testing agency.

1. Insulation Installed Indoors: Flame-spread index of 25 or less, and smoke-developed index of 50 or less.
2. Insulation Installed Outdoors: Flame-spread index of 75 or less, and smoke-developed index of 150 or less.

C. Comply with the following applicable standards and other requirements specified for miscellaneous components:

1. Supply and Drain Protective Shielding Guards: ICC A117.1.

1.13 UNINSPECTED WORK

A. The Contractor shall not allow or cause any of his work to be covered up or closed in until it has been inspected, tested, approved by all authorities have jurisdiction, and until Project Record drawings have been properly annotated.

B. Should any of his work be covered up or closed in before such inspection, he shall, at his own expense, uncover the work to the satisfaction of the inspection party. All related repair work cost shall be borne by the Contractor.

1.14 RECORD DRAWINGS (Also see General Conditions)

A. Contractor shall provide and keep up-to-date a complete "as-built" record set of blueline prints which shall show every change from the original drawings and the exact "as-built" locations and sizes of the work provided under this Section of the specifications. This set shall include locations, dimensions, depth of buried piping, cleanouts, shut-off valves, sewer invert locations, plugged wyes, tees, etc. On completion of the work, the Contractor shall incorporate all as-built information on a set of reproducible tracings provided by the Architect and this set of reproducibles shall be delivered to the Architect.

1.15 GUARANTEES

A. Contractor shall guarantee the entire plumbing and piping systems unconditionally for a period of one (1) year after final acceptance. If, during this period, any materials, equipment, or any part of the systems fail to function properly, the Contractor shall make good the defects promptly and without any expense to the Owner.

B. Contractor shall be responsible for all damage to any part of the premises caused by leaks in pipelines or equipment furnished and installed under this Section for a period of one (1) year after date of acceptance of his work.

C. All equipment and fixtures shall carry manufacturer's warranty against defective parts or poor workmanship for not less than one (1) year. See specific equipment specifications for extended warranty requirements.

1.16 DELIVERY, STORAGE, AND HANDLING

A. Packaging: Insulation material containers shall be marked by manufacturer with appropriate ASTM standard designation, type and grade, and maximum use temperature.

1.17 COORDINATION

A. Coordinate sizes and locations of supports, hangers, and insulation shields specified in Section 220529 "Hangers and Supports for Plumbing Piping and Equipment."

B. Coordinate clearance requirements with piping Installer for piping insulation application. Before preparing piping Shop Drawings, establish and maintain clearance requirements for installation of insulation and field-applied jackets and finishes and for space required for maintenance.

C. Coordinate installation and testing of heat tracing.

1.18 SCHEDULING

A. Schedule insulation application after pressure testing systems and, where required, after installing and testing heat tracing. Insulation application may begin on segments that have satisfactory test results.

B. Complete installation and concealment of plastic materials as rapidly as possible in each area of construction.

PART 2 - PRODUCTS

2.1 INSULATION MATERIALS

A. Hot Water Pipe Insulation: All hot water supply and return piping, except exposed connections to plumbing fixtures, flanges and unions shall be insulated with ASTM C547, Class I, "Johns-Manville" "Micro-Lock" 850-APT, Owens-Corning Fiberglass Corp., ASJ/SL-11 or approved equal, 1" thick for sizes up to 2" and 1-1/2" thick for sizes 2" and larger with “Johns-Manville” “Zeston” pre-formed insulation inserts for all fittings. Insulation at all fittings shall be equal in

thickness to insulation for piping. Insulation shall have a flame spread of not more than 25 and a smoke density not exceeding 50 per 2016 CMC

1. Exposed insulated piping in occupied areas and exposed outside the building shall be covered with Johns-Manville" "Zeston" 30-mil thick white PVC jacketing material per ASTM D1784 with "Johns-Manville" "Zeston" pre-formed insulation inserts for all fittings. Insulation at all fittings shall be equal in thickness to insulation for piping. Jacketing shall comply with ASTM E84, and shall have a flame spread of not more than 25 and a smoke density not exceeding 50 per 2016 CMC.
2. Hot water piping below slab shall have insulation protected by a 10-mil thick polyethylene plastic sleeve sealed watertight with poly vinyl chloride tape.

B. Comply with requirements in "Piping Insulation Schedule, General," "Indoor Piping Insulation Schedule," "Outdoor, Aboveground Piping Insulation Schedule," and "Outdoor, Underground Piping Insulation Schedule" articles for where insulating materials shall be applied.

C. Products shall not contain asbestos, lead, mercury, or mercury compounds.

D. Products that come in contact with stainless steel shall have a leachable chloride content of less than 50 ppm when tested according to ASTM C 871.

E. Insulation materials for use on austenitic stainless steel shall be qualified as acceptable according to ASTM C 795.

F. Foam insulation materials shall not use CFC or HCFC blowing agents in the manufacturing process.

G. Mineral-Fiber, Preformed Pipe Insulation:

1. Products: Subject to compliance with requirements, provide one of the following:

   a. Johns Manville; Micro-Lok.
   b. Knauf Insulation; 1000-Degree Pipe Insulation.
   c. Owens Corning; Fiberglas Pipe Insulation.

2. Type I, 850 Deg F Materials: Mineral or glass fibers bonded with a thermosetting resin. Comply with ASTM C 547, Type I, Grade A, with factory-applied ASJ. Factory-applied jacket requirements are specified in "Factory-Applied Jackets" Article.

H. Polyolefin: Unicellular, polyethylene thermal plastic insulation. Comply with ASTM C 534 or ASTM C 1427, Type I, Grade 1 for tubular materials.

1. Products: Subject to compliance with requirements, provide one of the following:

   a. Armacell LLC; Tubolit.
   b. Nomaco Insulation; IMCOLOCK and NOMALOCK.

I. Condensate Pipe Insulation: All condensate piping within the building shall be insulated with "Imcoa" "Imcolock" ¾" nominal wall thickness closed-cell insulation. Insulation shall have a flame spread of not more than 25 and a smoke density not exceeding 50 per 2016 CMC. All joints shall be mitered and secured with black duct tape.

J. Indirect Waste Pipe Insulation: All indirect waste drains from refrigerated kitchen equipment shall be insulated with "Armacell" "Armaflex" insulating tape.

K. All insulation shall be continuous through supports and hangers.

L. All fixtures complying with the provisions of the Americans with Disabilities Act shall be provided with Prowrap insulation for exposed hot water pipe, tailpiece, and trap as manufactured by McGuire, and secured per manufacturers recommendations. No tape wrapping shall be permitted.

2.2 ADHESIVES

A. Materials shall be compatible with insulation materials, jackets, and substrates and for bonding insulation to itself and to surfaces to be insulated, unless otherwise indicated.

B. Mineral-Fiber Adhesive: Comply with MIL-A-3316C, Class 2, Grade A.

1. Products: Subject to compliance with requirements, provide one of the following:

   a. Childers Brand, Specialty Construction Brands, Inc., a business of H. B. Fuller Company; CP-127.
   b. Eagle Bridges - Marathon Industries; 225.
   c. Foster Brand, Specialty Construction Brands, Inc., a business of H. B. Fuller Company; 85-60/85-70.

2. For indoor applications, adhesive shall have a VOC content of 80 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).
3. Adhesive shall comply with the testing and product requirements of the California Department of Health Services' "Standard Practice for the Testing of Volatile Organic Emissions from Various Sources Using Small-Scale Environmental Chambers."

C. Phenolic Adhesive: Solvent-based resin adhesive, with a service temperature range of minus 75 to plus 300 deg F.

1. Products: Subject to compliance with requirements, provide one of the following:

   a. Childers Brand, Specialty Construction Brands, Inc., a business of H. B. Fuller Company; CP-96.
   b. Foster Brand, Specialty Construction Brands, Inc., a business of H. B. Fuller Company; 81-33.

2. For indoor applications, adhesive shall have a VOC content of 50 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).
3. Adhesive shall comply with the testing and product requirements of the California Department of Health Services' "Standard Practice for the Testing of Volatile Organic Emissions from Various Sources Using Small-Scale Environmental Chambers."

D. ASJ Adhesive, and FSK Jacket Adhesive: Comply with MIL-A-3316C, Class 2, Grade A for bonding insulation jacket lap seams and joints.

1. Products: Subject to compliance with requirements, provide one of the following:

   a. Childers Brand, Specialty Construction Brands, Inc., a business of H. B. Fuller Company; CP-82.
   b. Eagle Bridges - Marathon Industries; 225.
   c. Foster Brand, Specialty Construction Brands, Inc., a business of H. B. Fuller Company; 85-20.

2. For indoor applications, adhesive shall have a VOC content of 50 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).
3. Adhesive shall comply with the testing and product requirements of the California Department of Health Services' "Standard Practice for the Testing of Volatile Organic Emissions from Various Sources Using Small-Scale Environmental Chambers."

E. PVC Jacket Adhesive: Compatible with PVC jacket.

1. Products: Subject to compliance with requirements, provide the following:

   a. Johns Manville; Zeston Perma-Weld, CEEL-TITE Solvent Welding Adhesive.

2. For indoor applications, adhesive shall have a VOC content of 50 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).
3. Adhesive shall comply with the testing and product requirements of the California Department of Health Services' "Standard Practice for the Testing of Volatile Organic Emissions from Various Sources Using Small-Scale Environmental Chambers."

2.3 TAPES

A. ASJ Tape: White vapor-retarder tape matching factory-applied jacket with acrylic adhesive, complying with ASTM C 1136.

1. Products: Subject to compliance with requirements, provide one of the following:

   a. ABI, Ideal Tape Division; 428 AWF ASJ.
   b. Avery Dennison Corporation, Specialty Tapes Division; Fasson 0836.
   c. Compac Corporation; 104 and 105.
   d. Venture Tape; 1540 CW Plus, 1542 CW Plus, and 1542 CW Plus/SQ.

2. Width: 3 inches.
3. Thickness: 11.5 mils.
4. Adhesion: 90 ounces force/inch in width.
5. Elongation: 2 percent.
6. Tensile Strength: 40 lbf/inch in width.
7. ASJ Tape Disks and Squares: Precut disks or squares of ASJ tape.

B. PVC Tape: White vapor-retarder tape matching field-applied PVC jacket with acrylic adhesive; suitable for indoor and outdoor applications.

1. Products: Subject to compliance with requirements, provide one of the following:

   a. ABI, Ideal Tape Division; 370 White PVC tape.
   b. Compac Corporation; 130.
   c. Venture Tape; 1506 CW NS.

2. Width: 2 inches.
3. Thickness: 6 mils.
4. Adhesion: 64 ounces force/inch in width.
5. Elongation: 500 percent.
6. Tensile Strength: 18 lbf/inch in width.

2.4 SECUREMENTS

A. Staples: Outward-clinching insulation staples, nominal 3/4-inch- wide, stainless steel or Monel.

2.5 PROTECTIVE SHIELDING GUARDS

A. Protective Shielding Pipe Covers,:

1. Manufacturers: Subject to compliance with requirements, provide products by the following:

   a. McGuire Manufacturing.

2. Description: Manufactured plastic wraps for covering plumbing fixture hot- and cold-water supplies and trap and drain piping. Comply with Americans with Disabilities Act (ADA) requirements.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates and conditions for compliance with requirements for installation tolerances and other conditions affecting performance of insulation application.

1. Verify that systems to be insulated have been tested and are free of defects.
2. Verify that surfaces to be insulated are clean and dry.

B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

A. Surface Preparation: Clean and dry surfaces to receive insulation. Remove materials that will adversely affect insulation application.

B. Surface Preparation: Clean and prepare surfaces to be insulated. Before insulating, apply a corrosion coating to insulated surfaces as follows:

1. Stainless Steel: Coat 300 series stainless steel with an epoxy primer 5 mils thick and an epoxy finish 5 mils thick if operating in a temperature range between 140 and 300 deg F. Consult coating manufacturer for appropriate coating materials and application methods for operating temperature range.
2. Carbon Steel: Coat carbon steel operating at a service temperature between 32 and 300 deg F with an epoxy coating. Consult coating manufacturer for appropriate coating materials and application methods for operating temperature range.

C. Coordinate insulation installation with the trade installing heat tracing. Comply with requirements for heat tracing that apply to insulation.

D. Mix insulating cements with clean potable water; if insulating cements are to be in contact with stainless-steel surfaces, use demineralized water.

3.3 GENERAL INSTALLATION REQUIREMENTS

A. Install insulation materials, accessories, and finishes with smooth, straight, and even surfaces; free of voids throughout the length of piping including fittings, valves, and specialties.

B. Install insulation materials, forms, vapor barriers or retarders, jackets, and thicknesses required for each item of pipe system as specified in insulation system schedules.

C. Install accessories compatible with insulation materials and suitable for the service. Install accessories that do not corrode, soften, or otherwise attack insulation or jacket in either wet or dry state.

D. Install insulation with longitudinal seams at top and bottom of horizontal runs.

E. Install multiple layers of insulation with longitudinal and end seams staggered.

F. Do not weld brackets, clips, or other attachment devices to piping, fittings, and specialties.

G. Keep insulation materials dry during application and finishing.

H. Install insulation with tight longitudinal seams and end joints. Bond seams and joints with adhesive recommended by insulation material manufacturer.

I. Install insulation with least number of joints practical.

J. Where vapor barrier is indicated, seal joints, seams, and penetrations in insulation at hangers, supports, anchors, and other projections with vapor-barrier mastic.

1. Install insulation continuously through hangers and around anchor attachments.
2. For insulation application where vapor barriers are indicated, extend insulation on anchor legs from point of attachment to supported item to point of attachment to structure. Taper and seal ends at attachment to structure with vapor-barrier mastic.
3. Install insert materials and install insulation to tightly join the insert. Seal insulation to insulation inserts with adhesive or sealing compound recommended by insulation material manufacturer.
4. Cover inserts with jacket material matching adjacent pipe insulation. Install shields over jacket, arranged to protect jacket from tear or puncture by hanger, support, and shield.

K. Apply adhesives, mastics, and sealants at manufacturer's recommended coverage rate and wet and dry film thicknesses.

L. Install insulation with factory-applied jackets as follows:

1. Draw jacket tight and smooth.
2. Cover circumferential joints with 3-inch- wide strips, of same material as insulation jacket. Secure strips with adhesive and outward clinching staples along both edges of strip, spaced 4 inches o.c.
3. Overlap jacket longitudinal seams at least 1-1/2 inches. Install insulation with longitudinal seams at bottom of pipe. Clean and dry surface to receive self-sealing lap. Staple laps with outward clinching staples along edge at 2 inches o.c.

   a. For below-ambient services, apply vapor-barrier mastic over staples.

4. Cover joints and seams with tape, according to insulation material manufacturer's written instructions, to maintain vapor seal.

5. Where vapor barriers are indicated, apply vapor-barrier mastic on seams and joints and at ends adjacent to pipe flanges and fittings.

M. Cut insulation in a manner to avoid compressing insulation more than 75 percent of its nominal thickness.

N. Finish installation with systems at operating conditions. Repair joint separations and cracking due to thermal movement.

O. Repair damaged insulation facings by applying same facing material over damaged areas. Extend patches at least 4 inches beyond damaged areas. Adhere, staple, and seal patches similar to butt joints.

P. For above-ambient services, do not install insulation to the following:

1. Vibration-control devices.
2. Testing agency labels and stamps.
3. Nameplates and data plates.
4. Cleanouts.

3.4 PENETRATIONS

A. Insulation Installation at Roof Penetrations: Install insulation continuously through roof penetrations.

1. Seal penetrations with flashing sealant.
2. For applications requiring only indoor insulation, terminate insulation above roof surface and seal with joint sealant. For applications requiring indoor and outdoor insulation, install insulation for outdoor applications tightly joined to indoor insulation ends. Seal joint with joint sealant.
3. Extend jacket of outdoor insulation outside roof flashing at least 2 inches below top of roof flashing.
4. Seal jacket to roof flashing with flashing sealant.

B. Insulation Installation at Underground Exterior Wall Penetrations: Terminate insulation flush with sleeve seal. Seal terminations with flashing sealant.

C. Insulation Installation at Aboveground Exterior Wall Penetrations: Install insulation continuously through wall penetrations.

1. Seal penetrations with flashing sealant.
2. For applications requiring only indoor insulation, terminate insulation inside wall surface and seal with joint sealant. For applications requiring indoor and outdoor insulation, install insulation for outdoor applications tightly joined to indoor insulation ends. Seal joint with joint sealant.
3. Extend jacket of outdoor insulation outside wall flashing and overlap wall flashing at least 2 inches.
4. Seal jacket to wall flashing with flashing sealant.

D. Insulation Installation at Interior Wall and Partition Penetrations (That Are Not Fire Rated): Install insulation continuously through walls and partitions.

E. Insulation Installation at Fire-Rated Wall and Partition Penetrations: Install insulation continuously through penetrations of fire-rated walls and partitions.

1. Comply with requirements in Section 078413 "Penetration Firestopping" for firestopping and fire-resistive joint sealers.

F. Insulation Installation at Floor Penetrations:

1. Pipe: Install insulation continuously through floor penetrations.
2. Seal penetrations through fire-rated assemblies. Comply with requirements in Section 078413 "Penetration Firestopping."

3.5 GENERAL PIPE INSULATION INSTALLATION

A. Requirements in this article generally apply to all insulation materials except where more specific requirements are specified in various pipe insulation material installation articles.

B. Insulation Installation on Fittings, Valves, Strainers, Flanges, and Unions:

1. Install insulation over fittings, valves, strainers, flanges, unions, and other specialties with continuous thermal and vapor-retarder integrity unless otherwise indicated.
2. Insulate pipe elbows using preformed fitting insulation or mitered fittings made from same material and density as adjacent pipe insulation. Each piece shall be butted tightly against adjoining piece and bonded with adhesive. Fill joints, seams, voids, and irregular surfaces with insulating cement finished to a smooth, hard, and uniform contour that is uniform with adjoining pipe insulation.
3. Insulate tee fittings with preformed fitting insulation or sectional pipe insulation of same material and thickness as used for adjacent pipe. Cut sectional pipe insulation to fit. Butt each section closely to the next and hold in place with tie wire. Bond pieces with adhesive.
4. Insulate valves using preformed fitting insulation or sectional pipe insulation of same material, density, and thickness as used for adjacent pipe. Overlap adjoining pipe insulation by not less than two times the thickness of pipe insulation, or one pipe diameter, whichever is thicker. For valves, insulate up to and including the bonnets, valve stuffing-box studs, bolts, and nuts. Fill joints, seams, and irregular surfaces with insulating cement.
5. Insulate strainers using preformed fitting insulation or sectional pipe insulation of same material, density, and thickness as used for adjacent pipe. Overlap adjoining pipe insulation by not less than two times the thickness of pipe insulation, or one pipe diameter, whichever is thicker. Fill joints, seams, and irregular surfaces with insulating cement. Insulate strainers so strainer basket flange or plug can be easily removed and replaced without damaging the insulation and jacket. Provide a removable reusable insulation cover. For below-ambient services, provide a design that maintains vapor barrier.
6. Insulate flanges and unions using a section of oversized preformed pipe insulation. Overlap adjoining pipe insulation by not less than two times the thickness of pipe insulation, or one pipe diameter, whichever is thicker.
7. Cover segmented insulated surfaces with a layer of finishing cement and coat with a mastic. Install vapor-barrier mastic for below-ambient services and a breather mastic for above-ambient services. Reinforce the mastic with fabric-reinforcing mesh. Trowel the mastic to a smooth and well-shaped contour.
8. For services not specified to receive a field-applied jacket except for flexible elastomeric and polyolefin, install fitted PVC cover over elbows, tees, strainers, valves, flanges, and unions. Terminate ends with PVC end caps. Tape PVC covers to adjoining insulation facing using PVC tape.
9. Stencil or label the outside insulation jacket of each union with the word "union." Match size and color of pipe labels.

C. Insulate instrument connections for thermometers, pressure gages, pressure temperature taps, test connections, flow meters, sensors, switches, and transmitters on insulated pipes. Shape insulation at these connections by tapering it to and around the connection with insulating cement and finish with finishing cement, mastic, and flashing sealant.

D. Install removable insulation covers at locations indicated. Installation shall conform to the following:

1. Make removable flange and union insulation from sectional pipe insulation of same thickness as that on adjoining pipe. Install same insulation jacket as adjoining pipe insulation.
2. When flange and union covers are made from sectional pipe insulation, extend insulation from flanges or union long at least two times the insulation thickness over adjacent pipe insulation on each side of flange or union. Secure flange cover in place with stainless-steel or aluminum bands. Select band material compatible with insulation and jacket.
3. Construct removable valve insulation covers in same manner as for flanges, except divide the two-part section on the vertical center line of valve body.
4. When covers are made from block insulation, make two halves, each consisting of mitered blocks wired to stainless-steel fabric. Secure this wire frame, with its attached insulation, to flanges with tie wire. Extend insulation at least 2 inches over adjacent pipe insulation on each side of valve. Fill space between flange or union cover and pipe insulation with insulating cement. Finish cover assembly with insulating cement applied in two coats. After first coat is dry, apply and trowel second coat to a smooth finish.
5. Unless a PVC jacket is indicated in field-applied jacket schedules, finish exposed surfaces with a metal jacket.

3.6 INSTALLATION OF MINERAL-FIBER INSULATION

A. Insulation Installation on Straight Pipes and Tubes:

1. Secure each layer of preformed pipe insulation to pipe with wire or bands and tighten bands without deforming insulation materials.
2. Where vapor barriers are indicated, seal longitudinal seams, end joints, and protrusions with vapor-barrier mastic and joint sealant.
3. For insulation with factory-applied jackets on above-ambient surfaces, secure laps with outward clinched staples at 6 inches o.c.
4. For insulation with factory-applied jackets on below-ambient surfaces, do not staple longitudinal tabs. Instead, secure tabs with additional adhesive as recommended by insulation material manufacturer and seal with vapor-barrier mastic and flashing sealant.

B. Insulation Installation on Pipe Flanges:

1. Install preformed pipe insulation to outer diameter of pipe flange.
2. Make width of insulation section same as overall width of flange and bolts, plus twice the thickness of pipe insulation.
3. Fill voids between inner circumference of flange insulation and outer circumference of adjacent straight pipe segments with mineral-fiber blanket insulation.
4. Install jacket material with manufacturer's recommended adhesive, overlap seams at least 1 inch, and seal joints with flashing sealant.

C. Insulation Installation on Pipe Fittings and Elbows:

1. Install preformed sections of same material as straight segments of pipe insulation when available.

2. When preformed insulation elbows and fittings are not available, install mitered sections of pipe insulation, to a thickness equal to adjoining pipe insulation. Secure insulation materials with wire or bands.

D. Insulation Installation on Valves and Pipe Specialties:

1. Install preformed sections of same material as straight segments of pipe insulation when available.
2. When preformed sections are not available, install mitered sections of pipe insulation to valve body.
3. Arrange insulation to permit access to packing and to allow valve operation without disturbing insulation.
4. Install insulation to flanges as specified for flange insulation application.

3.7 INSTALLATION OF POLYOLEFIN INSULATION

A. Insulation Installation on Straight Pipes and Tubes:

1. Seal split-tube longitudinal seams and end joints with manufacturer's recommended adhesive to eliminate openings in insulation that allow passage of air to surface being insulated.

B. Insulation Installation on Pipe Flanges:

1. Install pipe insulation to outer diameter of pipe flange.
2. Make width of insulation section same as overall width of flange and bolts, plus twice the thickness of pipe insulation.
3. Fill voids between inner circumference of flange insulation and outer circumference of adjacent straight pipe segments with cut sections of polyolefin sheet insulation of same thickness as pipe insulation.
4. Secure insulation to flanges and seal seams with manufacturer's recommended adhesive to eliminate openings in insulation that allow passage of air to surface being insulated.

C. Insulation Installation on Pipe Fittings and Elbows:

1. Install mitered sections of polyolefin pipe insulation.
2. Secure insulation materials and seal seams with manufacturer's recommended adhesive to eliminate openings in insulation that allow passage of air to surface being insulated.

D. Insulation Installation on Valves and Pipe Specialties:

1. Install cut sections of polyolefin pipe and sheet insulation to valve body.
2. Arrange insulation to permit access to packing and to allow valve operation without disturbing insulation.
3. Install insulation to flanges as specified for flange insulation application.
4. Secure insulation to valves and specialties, and seal seams with manufacturer's recommended adhesive to eliminate openings in insulation that allow passage of air to surface being insulated.

3.8 FINISHES

A. Insulation with ASJ, Glass-Cloth, or Other Paintable Jacket Material: Paint jacket with paint system identified below and as specified in Section 099113 "Exterior Painting" and Section 099123 "Interior Painting."

1. Flat Acrylic Finish: Two finish coats over a primer that is compatible with jacket material and finish coat paint. Add fungicidal agent to render fabric mildew proof.

a. Finish Coat Material: Interior, flat, latex-emulsion size.

B. Flexible Elastomeric Thermal Insulation: After adhesive has fully cured, apply two coats of insulation manufacturer's recommended protective coating.

C. Color: Final color as selected by Architect. Vary first and second coats to allow visual inspection of the completed Work.

D. Do not field paint aluminum or stainless-steel jackets.

3.9 FIELD QUALITY CONTROL

A. Testing Agency: Owner will engage a qualified testing agency to perform tests and inspections.

B. Perform tests and inspections.

C. Tests and Inspections:

1. Inspect pipe, fittings, strainers, and valves, randomly selected by Architect, by removing field-applied jacket and insulation in layers in reverse order of their installation. Extent of inspection shall be limited to three locations of straight pipe, three locations of threaded fittings, three locations of welded fittings, three locations of threaded valves, and three locations of flanged valves for each pipe service defined in the "Piping Insulation Schedule, General" Article.

D. All insulation applications will be considered defective Work if sample inspection reveals noncompliance with requirements.

3.10 PIPING INSULATION SCHEDULE, GENERAL

A. Acceptable preformed pipe and tubular insulation materials and thicknesses are identified for each piping system and pipe size range. If more than one material is listed for a piping system, selection from materials listed is Contractor's option.

B. Items Not Insulated: Unless otherwise indicated, do not install insulation on the following:

1. Drainage piping located in crawl spaces.
2. Underground piping.
3. Chrome-plated pipes and fittings unless there is a potential for personnel injury.

3.11 INDOOR PIPING INSULATION SCHEDULE

A. Domestic Hot and Recirculated Hot Water:

1. NPS 1-1/4 and Smaller: Insulation shall be the following:

    a. Mineral-Fiber, Preformed Pipe Insulation, Type I: 1 inch thick.

2. NPS 1-1/2 and Larger: Insulation shall be the following:

    a. Mineral-Fiber, Preformed Pipe Insulation, Type I: 1 inch thick.

B. Exposed Sanitary Drains, Domestic Water, Domestic Hot Water, and Stops for Plumbing Fixtures for People with Disabilities:

1. All Pipe Sizes: Insulation shall be the following:

    a. McGuire pre-insulated trap and supply covers.

END OF SECTION 22 07 19

SECTION 22 11 16 - DOMESTIC WATER PIPING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section Includes:

1. Under-building-slab and aboveground domestic water pipes, tubes, and fittings inside buildings.
2. Encasement for piping.

B. Related Requirements:

1. Section 221113 "Facility Water Distribution Piping" for water-service piping outside the building from source to the point where water-service piping enters the building.

1.3 WORK INCLUDED

A. Furnish all labor, materials, services, testing, transportation and equipment necessary for the completion of all plumbing work as indicated on drawings and specified herein. Work materials and equipment not indicated or specified which is necessary for the complete and proper operation of the work of this Section in accordance with the true intent and meaning of the contract documents shall be provided and incorporated at no additional cost to the Owner.

1.4 QUALITY ASSURANCE

A. Code Requirements: All work covered by this Section shall conform to the latest requirements of the following regulations:

1. C.C.R., Title 24, Part 5 (2022 CPC).
2. 2022 California Plumbing Code.
3. SMACNA Seismic Restraint Manual Guidelines for Mechanical Systems.
4. National Fire Protection Association.
5. California State Division of Industrial Safety.
6. County Health Department.
7. Any other legally constituted body-having jurisdiction thereof.

B. Nothing in the specifications or drawings shall be construed to permit deviation from the requirements of governing codes unless approval for said deviation has been obtained from the legally constituted authorities having jurisdiction and from the Owner's representative.

1.5 DRAWINGS

A. Because of the small-scale drawings, it is not possible to indicate all offsets, fittings and accessories which may be required. The Contractor shall carefully investigate the conditions surrounding installation of his work, furnishing the necessary piping, fittings, valves, traps, and other devices which may be required to complete the installation.

B. The general arrangement indicated on the drawings shall be followed as closely as possible. Coordinate with the Architectural, Structural, Mechanical and Electrical Drawings and the work of other trades prior to installation of piping fixtures and equipment to verify adequate space available for installation of the work shown. In the event a field condition arises which makes it impossible to install the work as indicated, submit, in writing, the proposed departures to the Architect for his approval. Only when Architect's approval is given, in writing, shall Contractor proceed with installation of the work.

C. Special Note: Should the Contractor make changes in the installation differing from what is indicated on the contract drawings and not necessitated due to field conditions as indicated hereinabove, the Contractor shall be required to re-install the work to comply with what has been indicated on the contract drawings. Should it be impossible to re-install the work and the installation is in accordance with all governing authorities, the architect may permit the installation to remain. However, all costs incurred to revise the contract drawings by the engineer for resubmittal to the building department indicating the as-installed condition shall become the responsibility of the Contractor.

D. In case of a difference in the specifications or between the specifications and the drawings, the Contractor shall figure the most expensive alternate and after award of contract, shall secure direction from the Architect.

1.6 PERMITS, INSPECTIONS AND LICENSES

A. All permits, inspections and licenses required by the legally constituted authorities for installation of the work according to the plans and specifications shall be obtained and paid as a part of the work of this section.

1.7 UTILITIES

A. See Drawings for Points of Connection.

B. Certain site utilities are to be connected to and extended. Before laying of any pipe or digging of any trenches, Contractor shall determine by actual excavation and measurement exact location and depth of lines to which he is to connect. In event depth of lines is not sufficient to permit connection in manner indicated, Contractor shall obtain direction from the Owner's representative before proceeding with this work.

C. Verify that utility companies size their services and meters to suit ultimate demand indicated on the drawings.

D. Domestic Water: The Contractor shall be responsible for the domestic water service outside of the building within five feet (5') of the foundation, and within the building itself. See Civil Engineer's plans for onsite domestic water system.

E. Domestic Water Service: The Contractor shall arrange with the serving utility company for the installation of all water meter assemblies and reduced pressure backflow devices, including the

service mains and vaults, and all required appurtenances as indicated on the drawings and in accordance with serving utility standards and shall pay all costs incurred. All required capacity fees, frontage fees and inspections, shall be paid for by the Owner. Contractor shall provide necessary tap-in connections in water main for sterilizing of domestic water system. Contractor shall connect into the main water service line as indicated on the drawings. The installation shall be in accordance with the serving utility company's standards.

1.8 EXAMINATION OF PREMISES

A. Before bidding on this work, Contractors shall make a careful examination of the premises and shall thoroughly familiarize themselves with the requirements of the contract. By the act of submitting a proposal for the work included in this contract, the Contractor shall be deemed to have made such study and examination, and that he is familiar with and accepts all conditions of the site.

1.9 PROTECTION

A. All work, equipment and materials shall be protected at all times. Contractor shall make good all damage caused either directly or indirectly by his own workmen. Contractor shall also protect his own work from damage. He shall close all pipe openings with caps or plugs during installation. He shall protect all his equipment and materials against dirt, water, chemical and mechanical injury. Upon completion, all work shall be thoroughly cleaned and delivered in a new condition.

B. Contractor shall be held responsible for all damage to equipment and materials until he has received written notice from the Architect or Engineer that his work has been accepted.

1.10 LOCATIONS

A. The locations of apparatus, piping and equipment indicated on the drawings are approximate. Piping and equipment shall be installed in such a manner as to avoid all obstruction, preserve headroom, and keep openings and passages clear. The locations of and mounting heights of all fixtures shall be coordinated with the architectural plans and room elevations.

B. Clearances and Openings: Contractor shall cooperate and coordinate his work with all other trades to avoid conflict and permit for a neat and orderly appearance of the entire installation. The Contractor shall, in advance of the work, furnish instructions to the General Contractor as to his requirements for equipment and material installation of any kind, whether or not specifically mentioned on drawings or in the specifications, and shall include recesses, chases in walls, and all required openings in the structure. Should furnishing this information be neglected, delayed or incorrect and additional cuttings are found to be required, the cost of the same shall be charged to this Contractor.

C. Contractor shall verify and coordinate pipe routing with location of all electrical rooms, elevator equipment rooms, telecom/data rooms, and other rooms dedicated to the housing of switchgear, panels, or other electrical equipment. In no case shall piping be installed within or above the ceiling of such rooms.

1.11 SUBMITTAL DATA

A. Submittal Requirements:

1. Furnish, all at one time, prior to any installation, within the time noted below, six (6) copies of valid submittal data on all fixtures, material, equipment and devices. Each submitted item shall be indexed and referenced to these specifications and to identification numbers on fixtures and equipment schedules.
2. Manufacturers' submittal literature and shop drawings are required on all items to ensure the latest and most complete manufacturer's data is available for review. Requirements of the submittals and Engineer's submittal notes are a part of the work of this Division except that Engineer's notes may not be used as a means of increasing the scope of work of this Division.
3. Submittals will be checked for general conformance with the design concept of the project but the review does not guarantee quantities shown and does not supersede requirements of this Division to properly install work.
4. To be valid, all submittals must:

    a. Be delivered to the Architect's office within thirty-five (35) days of award of the contract. Contractor shall make time allowance for Engineer's review, return of comments, if any, and resubmittal if required. Corrections or changes in submittals returned as inadequate or incomplete shall be accomplished within this time limit.
    b. Clearly indicate and label as such any items proposed as substitution for that specified or shown on plans.
    c. Include all pertinent construction, installation, performance and technical data.
    d. Have all product data sheets clearly labeled to indicate the individual items being submitted. In addition, all required options and accessories shall be clearly marked.

        1) Product data sheets corresponding to items indicated on plans shall be clearly labeled with the corresponding fixture or equipment tag number.
        2) Product data sheets corresponding to items indicated in specifications shall be clearly labeled with the specification section, page and item numbers.

    e. Include, for every item which differs in size, configuration, connections, service, accessibility or any other significant way, a drawing to the same (or larger) scale as to the pertinent portions of the contract drawings. In this drawing show a complete layout of the system except that which is identical to the contract drawings, unless the unchanged portions must be shown to indicate such things as clearances. This drawing, together with the contract design drawings must show the complete system as revised to accommodate the proposed alternate.

B. Substitution Requirements:

1. Any items included in submittals and proposed by the Contractor as substitution for that specified or shown on plans shall be submitted within thirty five (35) days of award of the contract. After such time, proposed substitutions shall not be accepted for review, and the Contractor shall submit all items as specified or shown on plans.

    a. For each item proposed as substitution for that specified or shown on plans, copies of product data sheets for the specified item shall be placed side by side with product data sheets for the proposed substitution item within the submittal.

        1) In addition to the Submittal Requirements for labeling listed above, product data sheets for the specified item shall be clearly labeled "SPECIFIED ITEM, NOT SUBMITTED". Product data sheets for the corresponding proposed substitution item shall be clearly labeled "PROPOSED SUBSTITUTION".

b. Provide calculations and other detailed data justifying how any items proposed as substitution were selected for proposal. Data must be complete enough to permit detailed comparison of every significant characteristic for which the specified item was analyzed during design.

2. It shall be the Contractor's responsibility to provide sufficient information to allow the Engineer to analyze any proposed alternate. If inadequate information is provided, the proposal will not be approved and resubmittal will not be allowed.
3. The Contractor shall provide or perform tests required by Engineer for purpose of judging acceptability of proposed substitutions.
4. The Contractor assumes full responsibility that alternate items and procedures will meet the job requirements and is responsible for cost of redesign and of modifications to this and other parts of work caused by alternate items furnished under work in this Section. In view of these responsibilities, it is the purpose of these specifications to establish procedures to ensure that the Contractor has considered all the ramifications of proposed alternates before submitting them for review. Submittals which do not comply with the requirements of these specifications or which indicate proposed alternates that were selected without proper regard to the requirements of the job will not be approved. No more than one proposed alternate will be considered for each item.
5. Alternate items installed without Engineer's approval will be replaced with specified items at Contractor's expense.

1.12 ACTION SUBMITTALS

A. Product Data: For transition fittings and dielectric fittings.

1.13 INFORMATIONAL SUBMITTALS

A. System purging and disinfecting activities report.

B. Field quality-control reports.

1.14 FIELD CONDITIONS

A. Interruption of Existing Water Service: Do not interrupt water service to facilities occupied by Owner or others unless permitted under the following conditions and then only after arranging to provide temporary water service according to requirements indicated:

1. Notify Architect no fewer than two days in advance of proposed interruption of water service.
2. Do not interrupt water service without Architect's written permission.

PART 2 - PRODUCTS

2.1 PIPING MATERIALS

A. Piping within the building and above grade shall be Type "L" ASTM B88, hard drawn copper tubing with wrought copper sweat fittings ANSI B16.18 and B16.22,

B. Outdoor underground piping in sizes 2-1/2" and 3" shall be Type "L" ASTM B88, hard drawn copper as specified for water piping within the building. Piping 2" and smaller shall be Type "K" ASTM B88, hard drawn copper with wrought copper sweat fittings ANSI B16.18 and B16.22.

C. Piping below the building floor shall be Type "K" soft annealed copper tubing with no fittings below the slab.

2.2 COPPER TUBE AND FITTINGS

A. Hard Copper Tube: ASTM B 88, Type L water tube, drawn temper.

B. Soft Copper Tube: ASTM B 88, Type K water tube, annealed temper.

C. Wrought-Copper, Solder-Joint Fittings: ASME B16.22, wrought-copper pressure fittings.

D. Bronze Flanges: ASME B16.24, Class 150, with solder-joint ends.

E. Copper Unions:

1. MSS SP-123.
2. Cast-copper-alloy, hexagonal-stock body.
3. Ball-and-socket, metal-to-metal seating surfaces.
4. Solder-joint or threaded ends.

2.3 PIPING JOINING MATERIALS

A. Pipe-Flange Gasket Materials:

1. AWWA C110/A21.10, rubber, flat face, 1/8 inch thick or ASME B16.21, nonmetallic and asbestos free unless otherwise indicated.
2. Full-face or ring type unless otherwise indicated.

B. Metal, Pipe-Flange Bolts and Nuts: ASME B18.2.1, carbon steel unless otherwise indicated.

C. Solder Filler Metals: ASTM B 32, lead-free alloys.

D. Flux: ASTM B 813, water flushable.

E. Brazing Filler Metals: AWS A5.8/A5.8M, BCuP Series, copper-phosphorus alloys for general-duty brazing unless otherwise indicated.

2.4 ENCASEMENT FOR PIPING

A. Standard: ASTM A 674 or AWWA C105/A21.5.

B. Form: Sheet or tube.

C. Color: natural.

PART 3 - EXECUTION

3.1 EARTHWORK

A. Comply with requirements in Section 312000 "Earth Moving" for excavating, trenching, and backfilling.

3.2 PIPING INSTALLATION

A. Drawing plans, schematics, and diagrams indicate general location and arrangement of domestic water piping. Indicated locations and arrangements are used to size pipe and calculate friction loss, expansion, and other design considerations. Install piping as indicated unless deviations to layout are approved on coordination drawings.

B. Install copper tubing under building slab according to CDA's "Copper Tube Handbook."

C. Install underground copper tube in PE encasement according to ASTM A 674 or AWWA C105/A21.5.

D. Install shutoff valve, strainer, pressure gage, and test tee with valve inside the building at each domestic water-service entrance. Comply with requirements for pressure gages in Section 220519 "Meters and Gages for Plumbing Piping" and with requirements for drain valves and strainers in Section 221119 "Domestic Water Piping Specialties."

E. Install shutoff valve immediately upstream of each dielectric fitting.

F. Install domestic water piping level without pitch and plumb.

G. Install piping concealed from view and protected from physical contact by building occupants unless otherwise indicated and except in equipment rooms and service areas.

H. Install piping indicated to be exposed and piping in equipment rooms and service areas at right angles or parallel to building walls. Diagonal runs are prohibited unless specifically indicated otherwise.

I. Install piping above accessible ceilings to allow sufficient space for ceiling panel removal, and coordinate with other services occupying that space.

J. Install piping to permit valve servicing.

K. Install nipples, unions, special fittings, and valves with pressure ratings the same as or higher than the system pressure rating used in applications below unless otherwise indicated.

L. Install piping free of sags and bends.

M. Install fittings for changes in direction and branch connections.

N. Install unions in copper tubing at final connection to each piece of equipment, machine, and specialty.

O. Install thermometers on outlet piping from each water heater. Comply with requirements for thermometers in Section 220519 "Meters and Gages for Plumbing Piping."

P. Install sleeves for piping penetrations of walls, ceilings, and floors. Comply with requirements for sleeves specified in Section 220517 "Sleeves and Sleeve Seals for Plumbing Piping."

Q. Install sleeve seals for piping penetrations of concrete walls and slabs. Comply with requirements for sleeve seals specified in Section 220517 "Sleeves and Sleeve Seals for Plumbing Piping."

R. Install escutcheons for piping penetrations of walls, ceilings, and floors. Comply with requirements for escutcheons specified in Section 220518 "Escutcheons for Plumbing Piping."

3.3 JOINT CONSTRUCTION

A. Ream ends of pipes and tubes and remove burrs. Bevel plain ends of steel pipe.

B. Remove scale, slag, dirt, and debris from inside and outside of pipes, tubes, and fittings before assembly.

C. Threaded Joints: Thread pipe with tapered pipe threads according to ASME B1.20.1. Cut threads full and clean using sharp dies. Ream threaded pipe ends to remove burrs and restore full ID. Join pipe fittings and valves as follows:

1. Apply appropriate tape or thread compound to external pipe threads.
2. Damaged Threads: Do not use pipe or pipe fittings with threads that are corroded or damaged.

D. Brazed Joints for Copper Tubing: Comply with CDA's "Copper Tube Handbook," "Brazed Joints" chapter.

E. Soldered Joints for Copper Tubing: Apply ASTM B 813, water-flushable flux to end of tube. Join copper tube and fittings according to ASTM B 828 or CDA's "Copper Tube Handbook."

3.4 HANGER AND SUPPORT INSTALLATION

A. Comply with requirements for seismic-restraint devices in Section 220548 "Vibration and Seismic Controls for Plumbing Piping and Equipment."

B. Comply with requirements for pipe hanger, support products, and installation in Section 220529 "Hangers and Supports for Plumbing Piping and Equipment."

1. Vertical Piping: MSS Type 8 or 42, clamps.
2. Individual, Straight, Horizontal Piping Runs:

   a. 100 Feet and Less: MSS Type 1, adjustable, steel clevis hangers.
   b. Longer Than 100 Feet: MSS Type 43, adjustable roller hangers.
   c. Longer Than 100 Feet if Indicated: MSS Type 49, spring cushion rolls.

3. Multiple, Straight, Horizontal Piping Runs 100 Feet or Longer: MSS Type 44, pipe rolls. Support pipe rolls on trapeze.
4. Base of Vertical Piping: MSS Type 52, spring hangers.

C. Support vertical piping and tubing at base and at each floor.

D. Rod diameter may be reduced one size for double-rod hangers, to a minimum of 3/8 inch.

E. Install hangers for copper tubing with the following maximum horizontal spacing and minimum rod diameters:

1. NPS 2 and Smaller: 72 inches with 3/8-inch rod.
2. NPS 2-1/2 to NPS 3: 8 feet with 1/2-inch rod.

F. Install supports for vertical copper tubing every 10 feet.

G. Support piping and tubing not listed in this article according to MSS SP-69 and manufacturer's written instructions.

3.5 CONNECTIONS

A. Drawings indicate general arrangement of piping, fittings, and specialties.

B. When installing piping adjacent to equipment and machines, allow space for service and maintenance.

C. Connect domestic water piping to exterior water-service piping. Use transition fitting to join dissimilar piping materials.

D. Connect domestic water piping to water-service piping with shutoff valve; extend and connect to the following:

1. Water Heaters: Cold-water inlet and hot-water outlet piping in sizes indicated, but not smaller than sizes of water heater connections.
2. Plumbing Fixtures: Cold- and hot-water-supply piping in sizes indicated, but not smaller than that required by plumbing code.
3. Equipment: Cold- and hot-water-supply piping as indicated, but not smaller than equipment connections. Provide shutoff valve and union for each connection. Use flanges instead of unions for NPS 2-1/2 and larger.

3.6 PIPE AND EQUIPMENT IDENTIFICATION

A. Each operating and service line shut-off valve shall be identified by a 19 ga. brass tag with stamped, engraved type of service identified and area served, complete with hole and brass chain mounted on valve stem or handle. Tag shall be a minimum of one and one-half inch (1-1/2") in diameter.

B. All piping systems shall be readily identifiable by appropriate labeling with the name of the piping contained. Such labeling shall be by means of metal tags, stenciling, stamping, or with adhesive markers, in a manner that is not readily removable. Labeling shall appear on the piping at intervals of not more than 20 ft and at least once in each room and each story traversed by the piping system.

C. Provide on exterior wall of each building opposite the building's main gas service a sign reading "Gas Shut Off". Sign shall be metal with minimum 1-1/2" high-embossed letters.

1. All equipment shall be provided with name plate indicating all pertinent information on it

3.7 FIELD QUALITY CONTROL

A. Perform the following tests and inspections:

1. Piping Inspections:

   a. Do not enclose, cover, or put piping into operation until it has been inspected and approved by authorities having jurisdiction.
   b. During installation, notify authorities having jurisdiction at least one day before inspection must be made. Perform tests specified below in presence of authorities having jurisdiction:

      1) Roughing-in Inspection: Arrange for inspection of piping before concealing or closing in after roughing in and before setting fixtures.
      2) Final Inspection: Arrange for authorities having jurisdiction to observe tests specified in "Piping Tests" Subparagraph below and to ensure compliance with requirements.

   c. Reinspection: If authorities having jurisdiction find that piping will not pass tests or inspections, make required corrections and arrange for reinspection.
   d. Reports: Prepare inspection reports and have them signed by authorities having jurisdiction.

2. Piping Tests:

   a. Fill domestic water piping. Check components to determine that they are not air bound and that piping is full of water.
   b. Test for leaks and defects in new piping and parts of existing piping that have been altered, extended, or repaired. If testing is performed in segments, submit a separate report for each test, complete with diagram of portion of piping tested.
   c. Leave new, altered, extended, or replaced domestic water piping uncovered and unconcealed until it has been tested and approved. Expose work that was covered or concealed before it was tested.
   d. Cap and subject piping to static water pressure of 50 psig above operating pressure, without exceeding pressure rating of piping system materials. Isolate test source and allow it to stand for four hours. Leaks and loss in test pressure constitute defects that must be repaired.
   e. Repair leaks and defects with new materials, and retest piping or portion thereof until satisfactory results are obtained.
   f. Prepare reports for tests and for corrective action required.

B. Domestic water piping will be considered defective if it does not pass tests and inspections.

C. Prepare test and inspection reports.

3.8 ADJUSTING

A. Perform the following adjustments before operation:

1. Close drain valves, hydrants, and hose bibbs.
2. Open shutoff valves to fully open position.
3. Open throttling valves to proper setting.
4. Adjust balancing valves in hot-water-circulation return piping to provide adequate flow.

a. Manually adjust ball-type balancing valves in hot-water-circulation return piping to provide hot-water flow in each branch.
b. Adjust calibrated balancing valves to flows indicated.

5. Remove plugs used during testing of piping and for temporary sealing of piping during installation.
6. Remove and clean strainer screens. Close drain valves and replace drain plugs.
7. Remove filter cartridges from housings and verify that cartridges are as specified for application where used and are clean and ready for use.
8. Check plumbing specialties and verify proper settings, adjustments, and operation.

3.9 CLEANING

A. Clean and disinfect potable domestic water piping as follows:

1. Purge new piping and parts of existing piping that have been altered, extended, or repaired before using.
2. Use purging and disinfecting procedures prescribed by authorities having jurisdiction; if methods are not prescribed, use procedures described in either AWWA C651 or AWWA C652 or follow procedures described below:

a. Flush piping system with clean, potable water until dirty water does not appear at outlets.
b. Fill and isolate system according to either of the following:

1) Fill system or part thereof with water/chlorine solution with at least 50 ppm of chlorine. Isolate with valves and allow to stand for 24 hours. Operate all valves during the retention period.
2) Fill system or part thereof with water/chlorine solution with at least 200 ppm of chlorine. Isolate and allow to stand for three hours. Operate all valves during the retention period.

c. Flush system with clean, potable water until no chlorine is in water coming from system after the standing time.
d. Repeat procedures if biological examination shows contamination.
e. Submit water samples in sterile bottles to authorities having jurisdiction.

B. Prepare and submit reports of purging and disinfecting activities. Include copies of water-sample approvals from authorities having jurisdiction.

C. Clean interior of domestic water piping system. Remove dirt and debris as work progresses.

3.10 TESTING

A. No piping work shall be concealed or covered until piping has been tested, inspected and approved by the Inspector. All piping for plumbing systems shall be completely installed and tested as required by the Uniform Plumbing Code. Test pressures and times indicated are a minimum only. All tests shall be as required by the governing authority as well.

3.11 OPERATION INSTRUCTION

A. Prior to occupancy or prior to the date of final inspection, whichever may occur first, the Contractor shall prepare two (2) sets of typewritten instructions for the operation of all equipment, valves, etc., specified and furnished as a part of the work under this section, and shall assign a competent person, thoroughly familiar with the job, to demonstrate and instruct a representative of the Owner in the operation of the equipment. The time of said demonstration and instructions shall be arranged with the Owner's representative approximately one (1) week in advance. Verbal instructions shall include shut-off location of gas and water. The Contractor shall assemble all operation and maintenance data supplied by the manufacturers of the various pieces of equipment, all keys and special wrenches required to operate and service the equipment (including keys for yard boxes, gas stops and fixture stops), and all equipment warranties and deliver same to the representative of the Owner on date of said instructions.

3.12 PIPING SCHEDULE

A. Transition and special fittings with pressure ratings at least equal to piping rating may be used in applications below unless otherwise indicated.

B. Flanges and unions may be used for aboveground piping joints unless otherwise indicated.

C. Fitting Option: Extruded-tee connections and brazed joints may be used on aboveground copper tubing.

D. Under-building-slab, domestic water, building-service piping, NPS 3 and smaller, shall be the following:

1. Hard copper tube, ASTM B 88, Type L; wrought-copper, solder-joint fittings; and brazed joints.

E. Under-building-slab, domestic water piping, NPS 2 and smaller, shall be the following:

1. Soft copper tube, ASTM B 88, Type L; wrought-copper, solder-joint fittings; and brazed joints.

F. Aboveground domestic water piping shall be the following:

1. Hard copper tube, ASTM B 88, Type L; wrought-copper, solder-joint fittings; and soldered joints.

3.13 VALVE SCHEDULE

A. Drawings indicate valve types to be used. Where specific valve types are not indicated, the following requirements apply:

1. Shutoff Duty: Use ball valves for piping NPS 2 and smaller. Use butterfly valves with flanged ends for piping NPS 2-1/2 and larger.

B. Use check valves to maintain correct direction of domestic water flow to and from equipment.

END OF SECTION 22 11 16

SECTION 22 11 19 - DOMESTIC WATER PIPING SPECIALTIES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section Includes:

1. Vacuum breakers.
2. Backflow preventers.
3. Water pressure-reducing valves.
4. Balancing valves.
5. Temperature-actuated, water mixing valves.
6. Hose bibbs.
7. Water-hammer arresters.
8. Trap-seal primer valves.
9. Trap-seal primer systems.

B. Related Requirements:

1. Section 223200 "Domestic Water Filtration Equipment" for water filters in domestic water piping.
2. Retain subparagraphs below to cross-reference requirements Contractor might expect to find in this Section but are specified in other Sections.
3. Section 224300 "Medical Plumbing Fixtures" for thermostatic mixing valves for sitz baths, thermostatic mixing-valve assemblies for hydrotherapy equipment, and outlet boxes for dialysis equipment.
4. Section 224500 "Emergency Plumbing Fixtures" for water tempering equipment.
5. Section 224713 "Drinking Fountains" for water filters for water coolers.
6. Section 224716 "Electric Water Coolers" for water filters for water coolers.

1.3 WORK INCLUDED

A. Furnish all labor, materials, services, testing, transportation and equipment necessary for the completion of all plumbing work as indicated on drawings and specified herein. Work materials and equipment not indicated or specified which is necessary for the complete and proper operation of the work of this Section in accordance with the true intent and meaning of the contract documents shall be provided and incorporated at no additional cost to the Owner.

1.4 QUALITY ASSURANCE

A. Code Requirements: All work covered by this Section shall conform to the latest requirements of the following regulations:

1. C.C.R., Title 24, Part 5 (2022 CPC).
2. 2022 California Plumbing Code.
3. SMACNA Seismic Restraint Manual Guidelines for Mechanical Systems.
4. National Fire Protection Association.
5. California State Division of Industrial Safety.
6. County Health Department.
7. Any other legally constituted body-having jurisdiction thereof.

B. Nothing in the specifications or drawings shall be construed to permit deviation from the requirements of governing codes unless approval for said deviation has been obtained from the legally constituted authorities having jurisdiction and from the Owner's representative.

1.5 PERFORMANCE REQUIREMENTS

A. Components and installation shall be capable of withstanding the following minimum working pressure unless otherwise indicated:

1. Soil, Waste, and Vent Piping: 10-foot head of water.

B. Seismic Performance: Soil, waste, and vent piping and support and installation shall withstand the effects of earthquake motions determined according to ASCE/SEI 7.

1.6 DRAWINGS

A. Because of the small-scale drawings, it is not possible to indicate all offsets, fittings and accessories which may be required. The Contractor shall carefully investigate the conditions surrounding installation of his work, furnishing the necessary piping, fittings, valves, traps, and other devices which may be required to complete the installation.

B. The general arrangement indicated on the drawings shall be followed as closely as possible. Coordinate with the Architectural, Structural, Mechanical and Electrical Drawings and the work of other trades prior to installation of piping fixtures and equipment to verify adequate space available for installation of the work shown. In the event a field condition arises which makes it impossible to install the work as indicated, submit, in writing, the proposed departures to the Architect for his approval. Only when Architect's approval is given, in writing, shall Contractor proceed with installation of the work.

C. Special Note: Should the Contractor make changes in the installation differing from what is indicated on the contract drawings and not necessitated due to field conditions as indicated hereinabove, the Contractor shall be required to re-install the work to comply with what has been indicated on the contract drawings. Should it be impossible to re-install the work and the installation is in accordance with all governing authorities, the architect may permit the installation to remain. However, all costs incurred to revise the contract drawings by the engineer for resubmittal to the building department indicating the as-installed condition shall become the responsibility of the Contractor.

D. In case of a difference in the specifications or between the specifications and the drawings, the Contractor shall figure the most expensive alternate and after award of contract, shall secure direction from the Architect.

1.7 PERMITS, INSPECTIONS AND LICENSES

A. All permits, inspections and licenses required by the legally constituted authorities for installation of the work according to the plans and specifications shall be obtained and paid as a part of the work of this section.

1.8 UTILITIES

A. See Drawings for Points of Connection.

B. Certain site utilities are to be connected to and extended. Before laying of any pipe or digging of any trenches, Contractor shall determine by actual excavation and measurement exact location and depth of lines to which he is to connect. In event depth of lines is not sufficient to permit connection in manner indicated, Contractor shall obtain direction from the Owner's representative before proceeding with this work.

C. Verify that utility companies size their services and meters to suit ultimate demand indicated on the drawings.

D. Domestic Water: The Contractor shall be responsible for the domestic water service outside of the building within five feet (5') of the foundation, and within the building itself. See Civil Engineer's plans for onsite domestic water system.

E. Domestic Water Service: The Contractor shall arrange with the serving utility company for the installation of all water meter assemblies and reduced pressure backflow devices, including the service mains and vaults, and all required appurtenances as indicated on the drawings and in accordance with serving utility standards and shall pay all costs incurred. All required capacity fees, frontage fees and inspections, shall be paid for by the Owner. Contractor shall provide necessary tap-in connections in water main for sterilizing of domestic water system. Contractor shall connect into the main water service line as indicated on the drawings. The installation shall be in accordance with the serving utility company's standards.

1.9 EXAMINATION OF PREMISES

A. Before bidding on this work, Contractors shall make a careful examination of the premises and shall thoroughly familiarize themselves with the requirements of the contract. By the act of submitting a proposal for the work included in this contract, the Contractor shall be deemed to have made such study and examination, and that he is familiar with and accepts all conditions of the site.

1.10 PROTECTION

A. All work, equipment and materials shall be protected at all times. Contractor shall make good all damage caused either directly or indirectly by his own workmen. Contractor shall also protect his own work from damage. He shall close all pipe openings with caps or plugs during installation. He shall protect all his equipment and materials against dirt, water, chemical and mechanical injury. Upon completion, all work shall be thoroughly cleaned and delivered in a new condition.

B. Contractor shall be held responsible for all damage to equipment and materials until he has received written notice from the Architect or Engineer that his work has been accepted.

1.11 LOCATIONS

A. The locations of apparatus, piping and equipment indicated on the drawings are approximate. Piping and equipment shall be installed in such a manner as to avoid all obstruction, preserve headroom, and keep openings and passages clear. The locations of and mounting heights of all fixtures shall be coordinated with the architectural plans and room elevations.

B. Clearances and Openings: Contractor shall cooperate and coordinate his work with all other trades to avoid conflict and permit for a neat and orderly appearance of the entire installation. The Contractor shall, in advance of the work, furnish instructions to the General Contractor as to his requirements for equipment and material installation of any kind, whether or not specifically mentioned on drawings or in the specifications, and shall include recesses, chases in walls, and all required openings in the structure. Should furnishing this information be neglected, delayed or incorrect and additional cuttings are found to be required, the cost of the same shall be charged to this Contractor.

C. Contractor shall verify and coordinate pipe routing with location of all electrical rooms, elevator equipment rooms, telecom/data rooms, and other rooms dedicated to the housing of switchgear, panels, or other electrical equipment. In no case shall piping be installed within or above the ceiling of such rooms.

1.12 SUBMITTAL DATA

A. Submittal Requirements:

1. Furnish, all at one time, prior to any installation, within the time noted below, six (6) copies of valid submittal data on all fixtures, material, equipment and devices. Each submitted item shall be indexed and referenced to these specifications and to identification numbers on fixtures and equipment schedules.
2. Manufacturers' submittal literature and shop drawings are required on all items to ensure the latest and most complete manufacturer's data is available for review. Requirements of the submittals and Engineer's submittal notes are a part of the work of this Division except that Engineer's notes may not be used as a means of increasing the scope of work of this Division.
3. Submittals will be checked for general conformance with the design concept of the project but the review does not guarantee quantities shown and does not supersede requirements of this Division to properly install work.
4. To be valid, all submittals must:

    a. Be delivered to the Architect's office within thirty-five (35) days of award of the contract. Contractor shall make time allowance for Engineer's review, return of comments, if any, and resubmittal if required. Corrections or changes in submittals returned as inadequate or incomplete shall be accomplished within this time limit.
    b. Clearly indicate and label as such any items proposed as substitution for that specified or shown on plans.
    c. Include all pertinent construction, installation, performance and technical data.
    d. Have all product data sheets clearly labeled to indicate the individual items being submitted. In addition, all required options and accessories shall be clearly marked.

        1) Product data sheets corresponding to items indicated on plans shall be clearly labeled with the corresponding fixture or equipment tag number.
        2) Product data sheets corresponding to items indicated in specifications shall be clearly labeled with the specification section, page and item numbers.

e. Include, for every item which differs in size, configuration, connections, service, accessibility or any other significant way, a drawing to the same (or larger) scale as to the pertinent portions of the contract drawings. In this drawing show a complete layout of the system except that which is identical to the contract drawings, unless the unchanged portions must be shown to indicate such things as clearances. This drawing, together with the contract design drawings must show the complete system as revised to accommodate the proposed alternate.

B. Substitution Requirements:

1. Any items included in submittals and proposed by the Contractor as substitution for that specified or shown on plans shall be submitted within thirty five (35) days of award of the contract. After such time, proposed substitutions shall not be accepted for review, and the Contractor shall submit all items as specified or shown on plans.

   a. For each item proposed as substitution for that specified or shown on plans, copies of product data sheets for the specified item shall be placed side by side with product data sheets for the proposed substitution item within the submittal.

      1) In addition to the Submittal Requirements for labeling listed above, product data sheets for the specified item shall be clearly labeled “SPECIFIED ITEM, NOT SUBMITTED”. Product data sheets for the corresponding proposed substitution item shall be clearly labeled “PROPOSED SUBSTITUTION”.

   b. Provide calculations and other detailed data justifying how any items proposed as substitution were selected for proposal. Data must be complete enough to permit detailed comparison of every significant characteristic for which the specified item was analyzed during design.

2. It shall be the Contractor’s responsibility to provide sufficient information to allow the Engineer to analyze any proposed alternate. If inadequate information is provided, the proposal will not be approved and resubmittal will not be allowed.
3. The Contractor shall provide or perform tests required by Engineer for purpose of judging acceptability of proposed substitutions.
4. The Contractor assumes full responsibility that alternate items and procedures will meet the job requirements and is responsible for cost of redesign and of modifications to this and other parts of work caused by alternate items furnished under work in this Section. In view of these responsibilities, it is the purpose of these specifications to establish procedures to ensure that the Contractor has considered all the ramifications of proposed alternates before submitting them for review. Submittals which do not comply with the requirements of these specifications or which indicate proposed alternates that were selected without proper regard to the requirements of the job will not be approved. No more than one proposed alternate will be considered for each item.
5. Alternate items installed without Engineer's approval will be replaced with specified items at Contractor's expense.

1.13 UNINSPECTED WORK

A. The Contractor shall not allow or cause any of his work to be covered up or closed in until it has been inspected, tested, approved by all authorities have jurisdiction, and until Project Record drawings have been properly annotated.

B. Should any of his work be covered up or closed in before such inspection, he shall, at his own expense, uncover the work to the satisfaction of the inspection party. All related repair work cost shall be borne by the Contractor.

1.14 RECORD DRAWINGS (Also see General Conditions)

A. Contractor shall provide and keep up-to-date a complete "as-built" record set of blueline prints which shall show every change from the original drawings and the exact "as-built" locations and sizes of the work provided under this Section of the specifications. This set shall include locations, dimensions, depth of buried piping, cleanouts, shut-off valves, sewer invert locations, plugged wyes, tees, etc. On completion of the work, the Contractor shall incorporate all as-built information on a set of reproducible tracings provided by the Architect and this set of reproducibles shall be delivered to the Architect.

1.15 GUARANTEES (Also see General Conditions)

A. Contractor shall guarantee the entire plumbing and piping systems unconditionally for a period of one (1) year after final acceptance. If, during this period, any materials, equipment, or any part of the systems fail to function properly, the Contractor shall make good the defects promptly and without any expense to the Owner.

B. Contractor shall be responsible for all damage to any part of the premises caused by leaks in pipelines or equipment furnished and installed under this Section for a period of one (1) year after date of acceptance of his work.

C. All equipment and fixtures shall carry manufacturer's warranty against defective parts or poor workmanship for not less than one (1) year. See specific equipment specifications for extended warranty requirements.

1.16 CLOSEOUT SUBMITTALS

A. Operation and Maintenance Data: For domestic water piping specialties to include in emergency, operation, and maintenance manuals.

PART 2 - PRODUCTS

2.1 GENERAL REQUIREMENTS FOR PIPING SPECIALTIES

A. Potable-water piping and components shall comply with NSF 61 and NSF 14.

2.2 PERFORMANCE REQUIREMENTS

A. Minimum Working Pressure for Domestic Water Piping Specialties: 125 psig unless otherwise indicated.

2.3 VACUUM BREAKERS

A. Pipe-Applied, Atmospheric-Type Vacuum Breakers:

1. Manufacturers: Subject to compliance with requirements, provide products by the following:
2. Basis-of-Design Product: Subject to compliance with requirements, provide product indicated on Drawings or comparable product by one of the following:

    a. Ames Fire & Waterworks; a division of Watts Water Technologies, Inc.
    b. Watts; a division of Watts Water Technologies, Inc.; Watts Regulator Company.
    c. Zurn Industries, LLC; Plumbing Products Group; Wilkins Water Control Products.

3. Standard: ASSE 1001.
4. Size: NPS 1/4 to NPS 3 (DN 8 to DN 80), as required to match connected piping.
5. Body: Bronze.
6. Inlet and Outlet Connections: Threaded.
7. Finish: Rough bronze.

B. Hose-Connection Vacuum Breakers:

1. Manufacturers: Subject to compliance with requirements, provide products by the following:
2. Basis-of-Design Product: Subject to compliance with requirements, provide product indicated on Drawings or comparable product by one of the following:

    a. Watts; a division of Watts Water Technologies, Inc.; Watts Regulator Company.
    b. Woodford Manufacturing Company; a division of WCM Industries, Inc.
    c. Zurn Industries, LLC; Plumbing Products Group; Light Commercial Products.
    d. Zurn Industries, LLC; Plumbing Products Group; Wilkins Water Control Products.

3. Standard: ASSE 1011.
4. Body: Bronze, nonremovable, with manual drain.
5. Outlet Connection: Garden-hose threaded complying with ASME B1.20.7.
6. Finish: Rough bronze.

C. Pressure Vacuum Breakers:

1. Manufacturers: Subject to compliance with requirements, provide products by the following:
2. Basis-of-Design Product: Subject to compliance with requirements, provide product indicated on Drawings or comparable product by one of the following:

    a. Ames Fire & Waterworks; a division of Watts Water Technologies, Inc.
    b. Watts; a division of Watts Water Technologies, Inc.; Watts Regulator Company.
    c. Zurn Industries, LLC; Plumbing Products Group; Wilkins Water Control Products.

3. Standard: ASSE 1020.
4. Operation: Continuous-pressure applications.
5. Pressure Loss: 5 psig maximum, through middle third of flow range.
6. Size: See plans.
7. Design Flow Rate: See plans.
8. Selected Unit Flow Range Limits: See plans.
9. Accessories:

    a. Valves: Ball type, on inlet and outlet.

D. Laboratory-Faucet Vacuum Breakers:

1. Manufacturers: Subject to compliance with requirements, provide products by the following:
2. Basis-of-Design Product: Subject to compliance with requirements, provide product indicated on Drawings or comparable product by one of the following:

    a. Watts; a division of Watts Water Technologies, Inc.; Watts Regulator Company.
    b. Woodford Manufacturing Company; a division of WCM Industries, Inc.
    c. Zurn Industries, LLC; Plumbing Products Group; Wilkins Water Control Products.

3. Standard: ASSE 1035.
4. Size: NPS 1/4 or NPS 3/8 (DN 8 or DN 10) matching faucet size.
5. Body: Bronze.
6. End Connections: Threaded.
7. Finish: Chrome plated.

2.4 TEMPERATURE-ACTUATED, WATER MIXING VALVES

A. Water-Temperature Limiting Devices:

1. Manufacturers: Subject to compliance with requirements, provide products by the following:
2. Basis-of-Design Product: Subject to compliance with requirements, provide product indicated on Drawings or comparable product by one of the following:

    a. Symmons Industries, Inc.
    b. Bradley.

3. Standard: ASSE 1017.
4. Pressure Rating: 125 psig (860 kPa).
5. Type: Thermostatically controlled, water mixing valve.
6. Material: Bronze body with corrosion-resistant interior components.
7. Connections: Threaded[**union**] inlets and outlet.
8. Accessories: Check stops on hot- and cold-water supplies, and adjustable, temperature-control handle.
9. Tempered-Water Setting: 120°F.
10. Tempered-Water Design Flow Rate: 0.35 GPM.
11. Valve Finish: Rough bronze.

B. Primary, Thermostatic, Water Mixing Valves:

1. Manufacturers: Subject to compliance with requirements, provide products by the following:
2. Basis-of-Design Product: Subject to compliance with requirements, provide product indicated on Drawings or comparable product by one of the following:
    a. Symmons Industries, Inc.
    b. Bradley.

3. Standard: ASSE 1017.
4. Pressure Rating: 125 psig (860 kPa)minimum unless otherwise indicated.
5. Type: Exposed-mounted or Cabinet-type (Refer to Plumbing Fixture Schedule), thermostatically controlled, water mixing valve.
6. Material: Bronze body with corrosion-resistant interior components.
7. Connections: Threaded[**union**] inlets and outlet.

8. Accessories: Manual temperature control, check stops on hot- and cold-water supplies, and adjustable, temperature-control handle.
9. Tempered-Water Setting: 120°F.
10. Tempered-Water Design Flow Rate: 0.35 GPM.
11. Selected Valve Flow Rate at 45-psig (310-kPa) Pressure Drop: 0.35 GPM.
12. Valve Finish: Rough bronze.
13. Piping Finish: Copper.
14. Cabinet: Factory fabricated, stainless steel, for recessed or surface **(**Refer to Plumbing Fixture Schedule) mounting and with hinged, stainless-steel door.

C. Individual-Fixture, Water Tempering Valves:

1. Manufacturers: Subject to compliance with requirements, provide products by the following:
2. Basis-of-Design Product: Subject to compliance with requirements, provide product indicated on Drawings or comparable product by one of the following:

   a. Symmons Industries, Inc.
   b. Bradley.

3. Standard: ASSE 1016, thermostatically controlled, water tempering valve.
4. Pressure Rating: 125 psig (860 kPa) minimum unless otherwise indicated.
5. Body: Bronze body with corrosion-resistant interior components.
6. Temperature Control: Adjustable.
7. Inlets and Outlet: Threaded.
8. Finish: Rough or chrome-plated bronze.
9. Tempered-Water Setting: 110°F**.**
10. Tempered-Water Design Flow Rate: 0.35 GPM.

D. Primary Water Tempering Valves:

1. Manufacturers: Subject to compliance with requirements, provide products by the following:
2. Basis-of-Design Product: Subject to compliance with requirements, provide product indicated on Drawings or comparable product by one of the following:

   a. Symmons Industries, Inc.
   b. Bradley.

3. Standard: ASSE 1017, thermostatically controlled, water tempering valve, listed as tempering valve.
4. Pressure Rating: 125 psig (860 kPa) minimum unless otherwise indicated.
5. Body: Bronze.
6. Temperature Control: Manual.
7. Inlets and Outlet: Threaded.
8. Selected Primary Water Tempering Valve Size: See plans.
9. Tempered-Water Setting: 120°F**.**
10. Tempered-Water Design Flow Rate: See plans.
11. Tempered-Water Outlet Size: See plans for end connection.
12. Cold-Water Inlet Size: See plans for end connection.
13. Hot-Water Inlet Size: See plans for end connection.
14. Valve Finish: Rough bronze.

2.5 OUTLET BOXES

A. Clothes Washer Outlet Boxes:

1. Manufacturers: Subject to compliance with requirements, provide products by the following:
2. Basis-of-Design Product: Subject to compliance with requirements, provide product indicated on Drawings or comparable product by one of the following:

    a. Acorn Engineering Company.
    b. Guy Gray Manufacturing Co., Inc.
    c. IPS Corporation.
    d. Symmons Industries, Inc.
    e. Watts; a division of Watts Water Technologies, Inc.; Watts Regulator Company.
    f. Whitehall Manufacturing; a div. of Acorn Engineering Company.
    g. Zurn Industries, LLC; Plumbing Products Group; Light Commercial Products.

3. Mounting: Recessed.
4. Material and Finish: Plastic box and faceplate.
5. Faucet: Combination valved fitting or separate hot- and cold-water valved fittings complying with ASME A112.18.1. Include garden-hose thread complying with ASME B1.20.7 on outlets.
6. Supply Shutoff Fittings: NPS 1/2 (DN 15) gate, globe, or ball valves and NPS 1/2 (DN 15) copper, water tubing.
7. Drain: NPS 2 (DN 50) standpipe and P-trap for direct waste connection to drainage piping.
8. Inlet Hoses: Two 60-inch- (1500-mm-) long, rubber household clothes washer inlet hoses with female, garden-hose-thread couplings. Include rubber washers.
9. Drain Hose: One 48-inch- (1200-mm-) long, rubber household clothes washer drain hose with hooked end.

B. Icemaker Outlet Boxes:

1. Manufacturers: Subject to compliance with requirements, provide products by the following:
2. Basis-of-Design Product: Subject to compliance with requirements, provide product indicated on Drawings or comparable product by one of the following:

    a. Acorn Engineering Company.
    b. IPS Corporation.

3. Mounting: Recessed.
4. Material and Finish Plastic box and faceplate.
5. Faucet: Valved fitting complying with ASME A112.18.1. Include NPS 1/2 (DN 15) or smaller copper tube outlet.
6. Supply Shutoff Fitting: NPS 1/2 (DN 15) gate, globe, or ball valve and NPS 1/2 (DN 15) copper, water tubing.

2.6 HOSE BIBBS

A. Hose Bibbs:

1. Standard: ASME A112.18.1 for sediment faucets.
2. Body Material: Bronze.

3. Seat: Bronze, replaceable.
4. Supply Connections: NPS 3/4 threaded or solder-joint inlet.
5. Outlet Connection: Garden-hose thread complying with ASME B1.20.7.
6. Pressure Rating: 125 psig.
7. Vacuum Breaker: Integral nonremovable, drainable, hose-connection vacuum breaker complying with ASSE 1011.
8. Include operating key with each operating-key hose bibb.

2.7 WATER-HAMMER ARRESTERS

A. Water-Hammer Arresters:

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

   a. Precision Plumbing Products, Inc.
   b. Zurn Industries, LLC; Plumbing Products Group; Specification Drainage Products.

2. Standard: ASSE 1010 or PDI-WH 201.
3. Type: Metal bellows.
4. Size: ASSE 1010, Sizes AA and A through F, or PDI-WH 201, Sizes A through F.

2.8 TRAP-SEAL PRIMER DEVICE

A. Supply-Type, Trap-Seal Primer Device:

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

   a. MIFAB, Inc.
   b. Precision Plumbing Products, Inc.
   c. Sioux Chief Manufacturing Company, Inc.

2. Standard: ASSE 1018.
3. Pressure Rating: 125 psig minimum.
4. Body: Bronze.
5. Inlet and Outlet Connections: NPS 1/2 threaded, union, or solder joint.
6. Gravity Drain Outlet Connection: NPS 1/2 threaded or solder joint.
7. Finish: Chrome plated, or rough bronze for units used with pipe or tube that is not chrome finished.

2.9 TRAP-SEAL PRIMER SYSTEMS

A. Trap-Seal Primer Systems:

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

   a. Precision Plumbing Products, Inc.

2. Standard: ASSE 1044.
3. Piping: NPS 3/4, ASTM B 88, Type L; copper, water tubing.

4. Cabinet: Surface-mounted steel box with stainless-steel cover.
5. Electric Controls: 24-hour timer, solenoid valve, and manual switch for 120-V ac power.

    a. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.

6. Vacuum Breaker: ASSE 1001.
7. Number Outlets: Four.
8. Size Outlets: NPS 1/2.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Install water-hammer arresters in water piping according to PDI-WH 201.

B. Install supply-type, trap-seal primer valves with outlet piping pitched down toward drain trap a minimum of 1 percent, and connect to floor-drain body, trap, or inlet fitting. Adjust valve for proper flow.

C. Install trap-seal primer systems with outlet piping pitched down toward drain trap a minimum of 1 percent, and connect to floor-drain body, trap, or inlet fitting. Adjust system for proper flow.

3.2 Access Panels:

A. Wall access panels shall be minimum 12" x 12" for concealed valves and other equipment unless otherwise specified or indicated. Ceiling access panels shall be 18" x 18" minimum. Access panels shall be located and positioned for ready access and service of equipment housed within. Where access panels are specified with keyed cylinder locks, all such locks shall be identically keyed.
    1. Wall, Non-Fire Rated: Elmdor/Stoneman DW-SS-CL, drywall, stainless steel finish, cylinder lock.
    2. Ceiling, Non-fire Rated: Elmdor/Stoneman DW, drywall, prime coated finish, screwdriver latch.
    3. Wall, Fire Rated: Elmdor/Stoneman FR-SS-CL, fire rated, stainless steel finish, cylinder lock.
    4. Ceiling, Fire rated: Elmdor/Stoneman FRC, Fire rated, prime coated finish, return latch.
    5. Wall, Non-Fire Rated: Elmdor/Stoneman DW-SS-AKL, drywall, stainless steel finish, allen key latch.
    6. Ceiling, Non-fire Rated: Elmdor/Stoneman DW, drywall, prime coated finish, screwdriver latch.
    7. Wall, Fire Rated: Elmdor/Stoneman FR-SS, fire rated, stainless steel finish, return latch.
    8. Ceiling, Fire rated: Elmdor/Stoneman FRC, Fire rated, prime coated finish, return latch.

3.3 CONNECTIONS

A. Comply with requirements for ground equipment in Section 260526 "Grounding and Bonding for Electrical Systems."

B. Fire-retardant-treated-wood blocking is specified in Section 260519 "Low-Voltage Electrical Power Conductors and Cables" for electrical connections.

3.4 LABELING AND IDENTIFYING

A. Equipment Nameplates and Signs: Install engraved plastic-laminate equipment nameplate or sign on or near each of the following:
   1. Supply-type, trap-seal primer valves.
   2. Trap-seal primer systems.

B. Distinguish among multiple units, inform operator of operational requirements, indicate safety and emergency precautions, and warn of hazards and improper operations, in addition to identifying unit. Nameplates and signs are specified in Section 220553 "Identification for Plumbing Piping and Equipment."

3.5 FIELD QUALITY CONTROL

A. Domestic water piping specialties will be considered defective if they do not pass tests and inspections.

B. Prepare test and inspection reports.

3.6 ADJUSTING

A. Set field-adjustable pressure set points of water pressure-reducing valves.

B. Set field-adjustable flow set points of balancing valves.

C. Set field-adjustable temperature set points of temperature-actuated, water mixing valves.

END OF SECTION 22 11 19

SECTION 22 11 23 - FACILITY NATURAL-GAS PIPING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section Includes:

1. Pipes, tubes, and fittings.
2. Piping specialties.
3. Piping and tubing joining materials.
4. Valves.
5. Pressure regulators.
6. Concrete bases.

1.3 DEFINITIONS

A. Finished Spaces: Spaces other than mechanical and electrical equipment rooms, furred spaces, pipe and duct shafts, unheated spaces immediately below roof, spaces above ceilings, unexcavated spaces, crawlspaces, and tunnels.

B. Exposed, Interior Installations: Exposed to view indoors. Examples include finished occupied spaces and mechanical equipment rooms.

C. Exposed, Exterior Installations: Exposed to view outdoors or subject to outdoor ambient temperatures and weather conditions. Examples include rooftop locations.

1.4 WORK INCLUDED

A. Furnish all labor, materials, services, testing, transportation and equipment necessary for the completion of all plumbing work as indicated on drawings and specified herein. Work materials and equipment not indicated or specified which is necessary for the complete and proper operation of the work of this Section in accordance with the true intent and meaning of the contract documents shall be provided and incorporated at no additional cost to the Owner.

1.5 QUALITY ASSURANCE

A. Code Requirements: All work covered by this Section shall conform to the latest requirements of the following regulations:

1. C.C.R., Title 24, Part 5 (2022 CPC).
2. 2022 California Plumbing Code.

3. SMACNA Seismic Restraint Manual Guidelines for Mechanical Systems.
4. National Fire Protection Association.
5. California State Division of Industrial Safety.
6. County Health Department.
7. Any other legally constituted body-having jurisdiction thereof.

B. Nothing in the specifications or drawings shall be construed to permit deviation from the requirements of governing codes unless approval for said deviation has been obtained from the legally constituted authorities having jurisdiction and from the Owner's representative.

1.6 PERFORMANCE REQUIREMENTS

A. Minimum Operating-Pressure Ratings:

1. Piping and Valves: 100 psig minimum unless otherwise indicated.
2. Service Regulators: 65 psig minimum unless otherwise indicated.

B. Natural-Gas System Pressure within Buildings: 0.5 psig or less.

1.7 DRAWINGS

A. Because of the small-scale drawings, it is not possible to indicate all offsets, fittings and accessories which may be required. The Contractor shall carefully investigate the conditions surrounding installation of his work, furnishing the necessary piping, fittings, valves, traps, and other devices which may be required to complete the installation.

B. The general arrangement indicated on the drawings shall be followed as closely as possible. Coordinate with the Architectural, Structural, Mechanical and Electrical Drawings and the work of other trades prior to installation of piping fixtures and equipment to verify adequate space available for installation of the work shown. In the event a field condition arises which makes it impossible to install the work as indicated, submit, in writing, the proposed departures to the Architect for his approval. Only when Architect's approval is given, in writing, shall Contractor proceed with installation of the work.

C. Special Note: Should the Contractor make changes in the installation differing from what is indicated on the contract drawings and not necessitated due to field conditions as indicated hereinabove, the Contractor shall be required to re-install the work to comply with what has been indicated on the contract drawings. Should it be impossible to re-install the work and the installation is in accordance with all governing authorities, the architect may permit the installation to remain. However, all costs incurred to revise the contract drawings by the engineer for resubmittal to the building department indicating the as-installed condition shall become the responsibility of the Contractor.

D. In case of a difference in the specifications or between the specifications and the drawings, the Contractor shall figure the most expensive alternate and after award of contract, shall secure direction from the Architect.

1.8 PERMITS, INSPECTIONS AND LICENSES

A. All permits, inspections and licenses required by the legally constituted authorities for installation of the work according to the plans and specifications shall be obtained and paid as a part of the work of this section.

1.9 UTILITIES

A. See Drawings for Points of Connection.

B. Certain site utilities are to be connected to and extended. Before laying of any pipe or digging of any trenches, Contractor shall determine by actual excavation and measurement exact location and depth of lines to which he is to connect. In event depth of lines is not sufficient to permit connection in manner indicated, Contractor shall obtain direction from the Owner's representative before proceeding with this work.

C. Verify that utility companies size their services and meters to suit ultimate demand indicated on the drawings.

D. Gas Service and Meter Assembly: The Contractor shall arrange with the serving utility company for the installation of new gas service with complete meter assembly of the capacity indicated and in the location as shown on the drawings. All items served with gas shall be operated at full fire and adjusted by the Contractor. In cooperation with gas utility, make all required adjustments to main gas pressure regulators. The Owner shall pay for all required fees.

1.10 EXAMINATION OF PREMISES

A. Before bidding on this work, Contractors shall make a careful examination of the premises and shall thoroughly familiarize themselves with the requirements of the contract. By the act of submitting a proposal for the work included in this contract, the Contractor shall be deemed to have made such study and examination, and that he is familiar with and accepts all conditions of the site.

1.11 PROTECTION

A. All work, equipment and materials shall be protected at all times. Contractor shall make good all damage caused either directly or indirectly by his own workmen. Contractor shall also protect his own work from damage. He shall close all pipe openings with caps or plugs during installation. He shall protect all his equipment and materials against dirt, water, chemical and mechanical injury. Upon completion, all work shall be thoroughly cleaned and delivered in a new condition.

B. Contractor shall be held responsible for all damage to equipment and materials until he has received written notice from the Architect or Engineer that his work has been accepted.

1.12 LOCATIONS

A. The locations of apparatus, piping and equipment indicated on the drawings are approximate. Piping and equipment shall be installed in such a manner as to avoid all obstruction, preserve headroom, and keep openings and passages clear. The locations of and mounting heights of all fixtures shall be coordinated with the architectural plans and room elevations.

B. Clearances and Openings: Contractor shall cooperate and coordinate his work with all other trades to avoid conflict and permit for a neat and orderly appearance of the entire installation. The Contractor shall, in advance of the work, furnish instructions to the General Contractor as to his requirements for equipment and material installation of any kind, whether or not specifically mentioned on drawings or in the specifications, and shall include recesses, chases in walls, and all required openings in the structure. Should furnishing this information be neglected, delayed or incorrect and additional cuttings are found to be required, the cost of the same shall be charged to this Contractor.

C. Contractor shall verify and coordinate pipe routing with location of all electrical rooms, elevator equipment rooms, telecom/data rooms, and other rooms dedicated to the housing of switchgear, panels, or other electrical equipment. In no case shall piping be installed within or above the ceiling of such rooms.

1.13 SUBMITTAL DATA

A. Product Data: For each type of the following:

1. Piping specialties.
2. Valves. Include pressure rating, capacity, settings, and electrical connection data of selected models.
3. Pressure regulators. Indicate pressure ratings and capacities.
4. Dielectric fittings.

B. Submittal Requirements:

1. Furnish, all at one time, prior to any installation, within the time noted below, six (6) copies of valid submittal data on all fixtures, material, equipment and devices. Each submitted item shall be indexed and referenced to these specifications and to identification numbers on fixtures and equipment schedules.
2. Manufacturers' submittal literature and shop drawings are required on all items to ensure the latest and most complete manufacturer's data is available for review. Requirements of the submittals and Engineer's submittal notes are a part of the work of this Division except that Engineer's notes may not be used as a means of increasing the scope of work of this Division.
3. Submittals will be checked for general conformance with the design concept of the project but the review does not guarantee quantities shown and does not supersede requirements of this Division to properly install work.
4. To be valid, all submittals must:

    a. Be delivered to the Architect's office within thirty-five (35) days of award of the contract. Contractor shall make time allowance for Engineer's review, return of comments, if any, and resubmittal if required. Corrections or changes in submittals returned as inadequate or incomplete shall be accomplished within this time limit.
    b. Clearly indicate and label as such any items proposed as substitution for that specified or shown on plans.
    c. Include all pertinent construction, installation, performance and technical data.
    d. Have all product data sheets clearly labeled to indicate the individual items being submitted. In addition, all required options and accessories shall be clearly marked.

        1) Product data sheets corresponding to items indicated on plans shall be clearly labeled with the corresponding fixture or equipment tag number.
        2) Product data sheets corresponding to items indicated in specifications shall be clearly labeled with the specification section, page and item numbers.

e. Include, for every item which differs in size, configuration, connections, service, accessibility or any other significant way, a drawing to the same (or larger) scale as to the pertinent portions of the contract drawings. In this drawing show a complete layout of the system except that which is identical to the contract drawings, unless the unchanged portions must be shown to indicate such things as clearances. This drawing, together with the contract design drawings must show the complete system as revised to accommodate the proposed alternate.

C. Substitution Requirements:

1. Product Data: For each type of the following:

   a. Piping specialties.
   b. Valves. Include pressure rating, capacity, settings, and electrical connection data of selected models.
   c. Pressure regulators. Indicate pressure ratings and capacities.
   d. Dielectric fittings.

2. Any items included in submittals and proposed by the Contractor as substitution for that specified or shown on plans shall be submitted within thirty five (35) days of award of the contract. After such time, proposed substitutions shall not be accepted for review, and the Contractor shall submit all items as specified or shown on plans.

   a. For each item proposed as substitution for that specified or shown on plans, copies of product data sheets for the specified item shall be placed side by side with product data sheets for the proposed substitution item within the submittal.

      1) In addition to the Submittal Requirements for labeling listed above, product data sheets for the specified item shall be clearly labeled “SPECIFIED ITEM, NOT SUBMITTED”. Product data sheets for the corresponding proposed substitution item shall be clearly labeled “PROPOSED SUBSTITUTION”.

   b. Provide calculations and other detailed data justifying how any items proposed as substitution were selected for proposal. Data must be complete enough to permit detailed comparison of every significant characteristic for which the specified item was analyzed during design.

3. It shall be the Contractor’s responsibility to provide sufficient information to allow the Engineer to analyze any proposed alternate. If inadequate information is provided, the proposal will not be approved and resubmittal will not be allowed.
4. The Contractor shall provide or perform tests required by Engineer for purpose of judging acceptability of proposed substitutions.
5. The Contractor assumes full responsibility that alternate items and procedures will meet the job requirements and is responsible for cost of redesign and of modifications to this and other parts of work caused by alternate items furnished under work in this Section. In view of these responsibilities, it is the purpose of these specifications to establish procedures to ensure that the Contractor has considered all the ramifications of proposed alternates before submitting them for review. Submittals which do not comply with the requirements of these specifications or which indicate proposed alternates that were selected without proper regard to the requirements of the job will not be approved. No more than one proposed alternate will be considered for each item.
6. Alternate items installed without Engineer's approval will be replaced with specified items at Contractor's expense.

1.14 QUALITY ASSURANCE

A. Steel Support Welding Qualifications: Qualify procedures and personnel according to AWS D1.1/D1.1M, "Structural Welding Code - Steel."

B. Pipe Welding Qualifications: Qualify procedures and operators according to ASME Boiler and Pressure Vessel Code.

C. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.

1.15 DELIVERY, STORAGE, AND HANDLING

A. Handling Flammable Liquids: Remove and dispose of liquids from existing natural-gas piping according to requirements of authorities having jurisdiction.

B. Deliver pipes and tubes with factory-applied end caps. Maintain end caps through shipping, storage, and handling to prevent pipe end damage and to prevent entrance of dirt, debris, and moisture.

C. Store and handle pipes and tubes having factory-applied protective coatings to avoid damaging coating, and protect from direct sunlight.

D. Protect stored PE pipes and valves from direct sunlight.

1.16 PROJECT CONDITIONS

A. Perform site survey, research public utility records, and verify existing utility locations. Contact utility-locating service for area where Project is located.

B. Interruption of Existing Natural-Gas Service: Do not interrupt natural-gas service to facilities occupied by Owner or others unless permitted under the following conditions and then only after arranging to provide purging and startup of natural-gas supply according to requirements indicated:

1. Notify Construction Manager no fewer than two days in advance of proposed interruption of natural-gas service.
2. Do not proceed with interruption of natural-gas service without Construction Manager's written permission.

1.17 COORDINATION

A. Coordinate sizes and locations of concrete bases with actual equipment provided.

PART 2 - PRODUCTS

2.1 Gas Piping:

A. Concealed gas piping within the building shall be Schedule 40 black steel pipe conforming to ASTM A-53 using 150 pound banded malleable iron screwed fittings for piping 2" and smaller and weld type steel fittings for piping 2-1/2" and larger.

B. Exposed gas piping outside the building shall be Schedule 40 galvanized steel pipe conforming to ASTM A-53 using galvanized 150 pound banded galvanized malleable iron screwed fittings for piping in sizes 2" and smaller and seamless weld type steel fittings for all piping in sizes 2-1/2" and larger.

C. Underground gas piping shall be SDR-11 Polyethylene PE2406 (Yellow) as manufactured by Driscoplex. Fittings shall be socket fusion weld Polyethylene as manufactured by Performance Pipe or Central, PE2406 (Yellow) complying with ASTM, D2513. Where required provide "Lyco" or Double "O" seal transition fittings between steel and polyethylene as manufactured by Central, all identified and approved for gas service. A 14 gauge copper tracer wire shall be installed with and attached to piping and shall terminate above grade at each end. Underground polyethylene piping shall be installed by personnel certified by the pipe manufacturer as having received instructions directly from the pipe manufacturer's field representative. Contractors not having certified personnel will be required to have a factory representative of the pipe manufacturer visit the site at the time of underground pipe installation and provide the required instructions. All required cost for training and certification shall be paid for by Contractor.

1. Upon completion of the gas piping underground installation, Contractor shall submit a written report directly to the Architect stating that all materials installed are as specified and approved, and that installation was performed by factory certified personnel and tested to 60 P.S.I.
2. All piping on roof shall be supported by pipe supports as manufactured by MAPA Products. Products by Miro Industries and Erico shall be accepted for submittal review.

    a. Pressurized Piping:
        1) For pipe sizes 1” and less: MS-1 single post, adjustable height pipe support.
        2) For pipe sizes 2 ½” and less: MS-4 adjustable, roller pipe support.
        3) For pipe sizes 4” and less: MS-5 adjustable, roller pipe support.
    b. Gravity System Piping 2” and Less: MS-1 single post, adjustable height pipe support.
3. All underground non-metallic piping shall have 14 gauge copper "Tracer Wire" continuous for entire length.

2.2 PIPES, TUBES, AND FITTINGS

A. Steel Pipe: ASTM A 53/A 53M, black steel, Schedule 40, Type E or S, Grade B.

1. Malleable-Iron Threaded Fittings: ASME B16.3, Class 150, standard pattern.
2. Wrought-Steel Welding Fittings: ASTM A 234/A 234M for butt welding and socket welding.
3. Unions: ASME B16.39, Class 150, malleable iron with brass-to-iron seat, ground joint, and threaded ends.
4. Forged-Steel Flanges and Flanged Fittings: ASME B16.5, minimum Class 150, including bolts, nuts, and gaskets of the following material group, end connections, and facings:

a. Material Group: 1.1.
b. End Connections: Threaded or butt welding to match pipe.
c. Lapped Face: Not permitted underground.
d. Gasket Materials: ASME B16.20, metallic, flat, asbestos free, aluminum o-rings, and spiral-wound metal gaskets.
e. Bolts and Nuts: ASME B18.2.1, carbon steel aboveground and stainless steel underground.

Protective Coating for Underground Piping: Factory-applied, three-layer coating of epoxy, adhesive, and PE.

f. Joint Cover Kits: Epoxy paint, adhesive, and heat-shrink PE sleeves.

B. PE Pipe: ASTM D 2513, SDR 11.

1. PE Fittings: ASTM D 2683, socket-fusion type or ASTM D 3261, butt-fusion type with dimensions matching PE pipe.
2. PE Transition Fittings: Factory-fabricated fittings with PE pipe complying with ASTM D 2513, SDR 11; and steel pipe complying with ASTM A 53/A 53M, black steel, Schedule 40, Type E or S, Grade B.
3. Anodeless Service-Line Risers: Factory fabricated and leak tested.

a. Underground Portion: PE pipe complying with ASTM D 2513, SDR 11 inlet.
b. Aboveground Portion: PE transition fitting.
c. Outlet shall be threaded or flanged or suitable for welded connection.
d. Tracer wire connection.
e. Ultraviolet shield.
f. Stake supports with factory finish to match steel pipe casing or carrier pipe.

4. Transition Service-Line Risers: Factory fabricated and leak tested.

a. Underground Portion: PE pipe complying with ASTM D 2513, SDR 11 inlet connected to steel pipe complying with ASTM A 53/A 53M, Schedule 40, Type E or S, Grade B, with corrosion-protective coating for aboveground outlet.
b. Outlet shall be threaded or flanged or suitable for welded connection.
c. Bridging sleeve over mechanical coupling.
d. Factory-connected anode.
e. Tracer wire connection.
f. Ultraviolet shield.
g. Stake supports with factory finish to match steel pipe casing or carrier pipe.

5. Plastic Mechanical Couplings,NPS 1-1/2 and Smaller: Capable of joining PE pipe to PE pipe.

a. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1) Lyall, R. W. & Company, Inc.
2) Mueller Co.; Gas Products Div.
3) Perfection Corporation; a subsidiary of American Meter Company.

b. PE body with molded-in, stainless-steel support ring.
c. Buna-nitrile seals.
d. Acetal collets.
e. Electro-zinc-plated steel stiffener.

6. Steel Mechanical Couplings: Capable of joining plain-end PE pipe to PE pipe, steel pipe to PE pipe, or steel pipe to steel pipe.

   a. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

      1) Dresser Piping Specialties; Division of Dresser, Inc.
      2) Smith-Blair, Inc.

   b. Stainless-steel flanges and tube with epoxy finish.
   c. Buna-nitrile seals.
   d. Stainless-steel bolts, washers, and nuts.
   e. Factory-installed anode for steel-body couplings installed underground.

2.3 PIPING SPECIALTIES

A. Appliance Flexible Connectors:

1. Indoor, Fixed-Appliance Flexible Connectors: Comply with ANSI Z21.24.
2. Outdoor, Appliance Flexible Connectors: Comply with ANSI Z21.75.
3. Corrugated stainless-steel tubing with polymer coating.
4. Operating-Pressure Rating: 0.5 psig.
5. End Fittings: Zinc-coated steel.
6. Threaded Ends: Comply with ASME B1.20.1.

A. Y-Pattern Strainers:

1. Body: ASTM A 126, Class B, cast iron with bolted cover and bottom drain connection.
2. End Connections: Threaded ends for NPS 2 and smaller; flanged ends for NPS 2-1/2 and larger.
3. Strainer Screen: 40-mesh startup strainer, and perforated stainless-steel basket with 50 percent free area.
4. CWP Rating: 125 psig.

B. Weatherproof Vent Cap: Cast- or malleable-iron increaser fitting with corrosion-resistant wire screen, with free area at least equal to cross-sectional area of connecting pipe and threaded-end connection.

2.4 JOINING MATERIALS

A. Joint Compound and Tape: Suitable for natural gas.

B. Welding Filler Metals: Comply with AWS D10.12/D10.12M for welding materials appropriate for wall thickness and chemical analysis of steel pipe being welded.

C. Brazing Filler Metals: Alloy with melting point greater than 1000 deg F complying with AWS A5.8/A5.8M. Brazing alloys containing more than 0.05 percent phosphorus are prohibited.

2.5 MANUAL GAS SHUTOFF VALVES

A. See "Underground Manual Gas Shutoff Valve Schedule" and "Aboveground Manual Gas Shutoff Valve Schedule" Articles for where each valve type is applied in various services.

B. General Requirements for Metallic Valves, NPS 2 and Smaller: Comply with ASME B16.33.

1. CWP Rating: 125 psig.
2. Threaded Ends: Comply with ASME B1.20.1.
3. Dryseal Threads on Flare Ends: Comply with ASME B1.20.3.
4. Tamperproof Feature: Locking feature for valves indicated in "Underground Manual Gas Shutoff Valve Schedule" and "Aboveground Manual Gas Shutoff Valve Schedule" Articles.
5. Listing: Listed and labeled by an NRTL acceptable to authorities having jurisdiction for valves 1 inch and smaller.
6. Service Mark: Valves 1-1/4 inches to NPS 2 shall have initials "WOG" permanently marked on valve body.

C. General Requirements for Metallic Valves, NPS 2-1/2 and Larger: Comply with ASME B16.38.

1. CWP Rating: 125 psig.
2. Flanged Ends: Comply with ASME B16.5 for steel flanges.
3. Tamperproof Feature: Locking feature for valves indicated in "Underground Manual Gas Shutoff Valve Schedule" and "Aboveground Manual Gas Shutoff Valve Schedule" Articles.
4. Service Mark: Initials "WOG" shall be permanently marked on valve body.

D. Two-Piece, Full-Port, Bronze Ball Valves with Bronze Trim: MSS SP-110.

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

   a. McDonald, A. Y. Mfg. Co.
   b. Nibco.

2. Body: Bronze, complying with ASTM B 584.
3. Ball: Chrome-plated bronze.
4. Stem: Bronze; blowout proof.
5. Seats: Reinforced TFE; blowout proof.
6. Packing: Threaded-body packnut design with adjustable-stem packing.
7. Ends: Threaded, flared, or socket as indicated in "Underground Manual Gas Shutoff Valve Schedule" and "Aboveground Manual Gas Shutoff Valve Schedule" Articles.
8. CWP Rating: 600 psig.
9. Listing: Valves NPS 1 and smaller shall be listed and labeled by an NRTL acceptable to authorities having jurisdiction.
10. Service: Suitable for natural-gas service with "WOG" indicated on valve body.

E. Bronze Plug Valves: MSS SP-78.

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

   a. Lee Brass Company.
   b. McDonald, A. Y. Mfg. Co.

2. Body: Bronze, complying with ASTM B 584.
3. Plug: Bronze.
4. Ends: Threaded, socket, or flanged as indicated in "Underground Manual Gas Shutoff Valve Schedule" and "Aboveground Manual Gas Shutoff Valve Schedule" Articles.
5. Operator: Square head or lug type with tamperproof feature where indicated.
6. Pressure Class: 125 psig.
7. Listing: Valves NPS 1 and smaller shall be listed and labeled by an NRTL acceptable to authorities having jurisdiction.
8. Service: Suitable for natural-gas service with "WOG" indicated on valve body.

F. PE Ball Valves: Comply with ASME B16.40.

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
   a. Kerotest Manufacturing Corp.
   b. Lyall, R. W. & Company, Inc.
   c. Perfection Corporation; a subsidiary of American Meter Company.
2. Body: PE.
3. Ball: PE.
4. Stem: Acetal.
5. Seats and Seals: Nitrile.
6. Ends: Plain or fusible to match piping.
7. CWP Rating: 80 psig.
8. Operating Temperature: Minus 20 to plus 140 deg F.
9. Operator: Nut or flat head for key operation.
10. Include plastic valve extension.

G. Valve Boxes:

1. Cast-iron, two-section box.
2. Top section with cover with "GAS" lettering.
3. Bottom section with base to fit over valve and barrel a minimum of 5 inches in diameter.
4. Adjustable cast-iron extensions of length required for depth of bury.
5. Include tee-handle, steel operating wrench with socket end fitting valve nut or flat head, and with stem of length required to operate valve.

2.6 EARTHQUAKE VALVES

A. Earthquake Valves: Comply with ASCE 25.

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

   a. Pacific Seismic Products, Inc.

2. Listing: Listed and labeled by an NRTL acceptable to authorities having jurisdiction.
3. Maximum Operating Pressure: 0.5 psig.
4. Cast-aluminum body with stainless-steel internal parts.
5. Nitrile-rubber, reset-stem o-ring seal.
6. Valve position, open or closed, indicator.
7. Composition valve seat with clapper held by spring or magnet locking mechanism.
8. Level indicator.
9. End Connections: Threaded for valves NPS 2 and smaller; flanged for valves NPS 2-1/2 and larger.

2.7 PRESSURE REGULATORS

A. General Requirements:

1. Single stage and suitable for natural gas.
2. Steel jacket and corrosion-resistant components.
3. Elevation compensator.
4. End Connections: Threaded for regulators NPS 2 and smaller; flanged for regulators NPS 2-1/2 and larger.

B. Line Pressure Regulators: Comply with ANSI Z21.80.

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

   a. American Meter Company.
   b. Fisher Control Valves and Regulators; Division of Emerson Process Management.

2. Body and Diaphragm Case: Cast iron or die-cast aluminum.
3. Springs: Zinc-plated steel; interchangeable.
4. Diaphragm Plate: Zinc-plated steel.
5. Seat Disc: Nitrile rubber resistant to gas impurities, abrasion, and deformation at the valve port.
6. Orifice: Aluminum; interchangeable.
7. Seal Plug: Ultraviolet-stabilized, mineral-filled nylon.
8. Single-port, self-contained regulator with orifice no larger than required at maximum pressure inlet, and no pressure sensing piping external to the regulator.
9. Pressure regulator shall maintain discharge pressure setting downstream, and not exceed 150 percent of design discharge pressure at shutoff.
10. Overpressure Protection Device: Factory mounted on pressure regulator.
11. Atmospheric Vent: Factory- or field-installed, stainless-steel screen in opening if not connected to vent piping.
12. Maximum Inlet Pressure: 5psig.

2.8 Access Panels:

A. Wall access panels shall be minimum 12" x 12" for concealed valves and other equipment unless otherwise specified or indicated. Ceiling access panels shall be 18" x 18" minimum. Access panels shall be located and positioned for ready access and service of equipment housed within. Where access panels are specified with keyed cylinder locks, all such locks shall be identically keyed.

1. Wall, Non-Fire Rated: Elmdor/Stoneman DW-SS-CL, drywall, stainless steel finish, cylinder lock.
2. Ceiling, Non-fire Rated: Elmdor/Stoneman DW, drywall, prime coated finish, screwdriver latch.
3. Wall, Fire Rated: Elmdor/Stoneman FR-SS-CL, fire rated, stainless steel finish, cylinder lock.
4. Ceiling, Fire rated: Elmdor/Stoneman FRC, Fire rated, prime coated finish, return latch.
5. Wall, Non-Fire Rated: Elmdor/Stoneman DW-SS-AKL, drywall, stainless steel finish, allen key latch.
6. Ceiling, Non-fire Rated: Elmdor/Stoneman DW, drywall, prime coated finish, screwdriver latch.
7. Wall, Fire Rated: Elmdor/Stoneman FR-SS, fire rated, stainless steel finish, return latch.
8. Ceiling, Fire rated: Elmdor/Stoneman FRC, Fire rated, prime coated finish, return latch.

2.9 LABELING AND IDENTIFYING

A. Detectable Warning Tape: Acid- and alkali-resistant, PE film warning tape manufactured for marking and identifying underground utilities, a minimum of 6 inches wide and 4 mils thick, continuously inscribed with a description of utility, with metallic core encased in a protective jacket for corrosion protection, detectable by metal detector when tape is buried up to 30 inches deep; colored yellow.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine roughing-in for natural-gas piping system to verify actual locations of piping connections before equipment installation.

B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

A. Close equipment shutoff valves before turning off natural gas to premises or piping section.

B. Inspect natural-gas piping according to NFPA 54 to determine that natural-gas utilization devices are turned off in piping section affected.

C. Comply with NFPA 54 requirements for prevention of accidental ignition.

3.3 OUTDOOR PIPING INSTALLATION

A. Comply with NFPA 54 for installation and purging of natural-gas piping.

B. Install underground, PE, natural-gas piping according to ASTM D 2774.

C. Steel Piping with Protective Coating:

1. Apply joint cover kits to pipe after joining to cover, seal, and protect joints.
2. Repair damage to PE coating on pipe as recommended in writing by protective coating manufacturer.
3. Replace pipe having damaged PE coating with new pipe.

D. Install fittings for changes in direction and branch connections.

3.4 INDOOR PIPING INSTALLATION

A. Comply with NFPA 54 for installation and purging of natural-gas piping.

B. Drawing plans, schematics, and diagrams indicate general location and arrangement of piping systems. Indicated locations and arrangements are used to size pipe and calculate friction loss, expansion, and other design considerations. Install piping as indicated unless deviations to layout are approved on Coordination Drawings.

C. Arrange for pipe spaces, chases, slots, sleeves, and openings in building structure during progress of construction, to allow for mechanical installations.

D. Install piping in concealed locations unless otherwise indicated and except in equipment rooms and service areas.

E. Install piping indicated to be exposed and piping in equipment rooms and service areas at right angles or parallel to building walls. Diagonal runs are prohibited unless specifically indicated otherwise.

F. Install piping above accessible ceilings to allow sufficient space for ceiling panel removal.

G. Locate valves for easy access.

H. Install piping free of sags and bends.

I. Install fittings for changes in direction and branch connections.

J. Verify final equipment locations for roughing-in.

K. Comply with requirements in Sections specifying gas-fired appliances and equipment for roughing-in requirements.

L. Drips and Sediment Traps: Install drips at points where condensate may collect, including service-meter outlets. Locate where accessible to permit cleaning and emptying. Do not install where condensate is subject to freezing.

1. Construct drips and sediment traps using tee fitting with bottom outlet plugged or capped. Use nipple a minimum length of 3 pipe diameters, but not less than 3 inches long and same size as connected pipe. Install with space below bottom of drip to remove plug or cap.

M. Extend relief vent connections for service regulators, line regulators, and overpressure protection devices to outdoors and terminate with weatherproof vent cap.

N. Conceal pipe installations in walls, pipe spaces, utility spaces, above ceilings, below grade or floors, and in floor channels unless indicated to be exposed to view.

O. Concealed Location Installations:

1. Above Accessible Ceilings: Natural-gas piping, fittings, valves, and regulators may be installed in accessible spaces without containment conduit.
2. In Walls or Partitions: Protect tubing installed inside partitions or hollow walls from physical damage using steel striker barriers at rigid supports.

a. Exception: Tubing passing through partitions or walls does not require striker barriers.

3. Prohibited Locations:

a. Do not install natural-gas piping in or through circulating air ducts, clothes or trash chutes, chimneys or gas vents (flues), ventilating ducts, or dumbwaiter or elevator shafts.
b. Do not install natural-gas piping in solid walls or partitions.

P. Use eccentric reducer fittings to make reductions in pipe sizes. Install fittings with level side down.

Q. Connect branch piping from top or side of horizontal piping.

R. Install unions in pipes NPS 2 and smaller, adjacent to each valve, at final connection to each piece of equipment. Unions are not required at flanged connections.

S. Do not use natural-gas piping as grounding electrode.

T. Install strainer on inlet of each line-pressure regulator.

U. Install sleeves for piping penetrations of walls, ceilings, and floors. Comply with requirements for sleeves specified in Section 220517 "Sleeves and Sleeve Seals for Plumbing Piping."

V. Install escutcheons for piping penetrations of walls, ceilings, and floors. Comply with requirements for escutcheons specified in Section 220518 "Escutcheons for Plumbing Piping."

3.5 VALVE INSTALLATION

A. Install manual gas shutoff valve for each gas appliance ahead of corrugated stainless-steel tubing, aluminum, or copper connector.

B. Install underground valves with valve boxes.

C. Install regulators and overpressure protection devices with maintenance access space adequate for servicing and testing.

D. Install earthquake valves aboveground outside buildings according to listing.

3.6 PIPING JOINT CONSTRUCTION

A. Ream ends of pipes and tubes and remove burrs.

B. Remove scale, slag, dirt, and debris from inside and outside of pipe and fittings before assembly.

C. Threaded Joints:

1. Thread pipe with tapered pipe threads complying with ASME B1.20.1.
2. Cut threads full and clean using sharp dies.
3. Ream threaded pipe ends to remove burrs and restore full inside diameter of pipe.
4. Apply appropriate tape or thread compound to external pipe threads unless dryseal threading is specified.
5. Damaged Threads: Do not use pipe or pipe fittings with threads that are corroded or damaged. Do not use pipe sections that have cracked or open welds.

D. Welded Joints:

1. Construct joints according to AWS D10.12/D10.12M, using qualified processes and welding operators.
2. Bevel plain ends of steel pipe.

3. Patch factory-applied protective coating as recommended by manufacturer at field welds and where damage to coating occurs during construction.

E. Flanged Joints: Install gasket material, size, type, and thickness appropriate for natural-gas service. Install gasket concentrically positioned.

F. PE Piping Heat-Fusion Joints: Clean and dry joining surfaces by wiping with clean cloth or paper towels. Join according to ASTM D 2657.
1. Plain-End Pipe and Fittings: Use butt fusion.
2. Plain-End Pipe and Socket Fittings: Use socket fusion.

3.7 HANGER AND SUPPORT INSTALLATION

A. Comply with requirements for pipe hangers and supports specified in Section 220529 "Hangers and Supports for Plumbing Piping and Equipment."

B. Install hangers for horizontal steel piping with the following maximum spacing and minimum rod sizes:

1. NPS 2 and Smaller: Maximum span, 6 feet; minimum rod size, 3/8 inch.
2. NPS 2-1/2 to NPS 3-1/2: Maximum span, 8feet; minimum rod size, 1/2 inch.

3.8 CONNECTIONS

A. Connect to utility's gas main according to utility's procedures and requirements.

B. Install piping adjacent to appliances to allow service and maintenance of appliances.

C. Connect piping to appliances using manual gas shutoff valves and unions. Install valve within 72 inches of each gas-fired appliance and equipment. Install union between valve and appliances or equipment.

D. Sediment Traps: Install tee fitting with capped nipple in bottom to form drip, as close as practical to inlet of each appliance.

3.9 LABELING AND IDENTIFYING

A. Comply with requirements in Section 220553 "Identification for Plumbing Piping and Equipment" for piping and valve identification.

B. Each operating and service line shut-off valve shall be identified by a 19 ga. brass tag with stamped, engraved type of service identified and area served, complete with hole and brass chain mounted on valve stem or handle. Tag shall be a minimum of one and one-half inch (1-1/2") in diameter.

C. All piping systems shall be readily identifiable by appropriate labeling with the name of the piping contained. Such labeling shall be by means of metal tags, stenciling, stamping, or with adhesive markers, in a manner that is not readily removable. Labeling shall appear on the piping at intervals of not more than 20 ft and at least once in each room and each story traversed by the piping system.

D. Provide on exterior wall of each building opposite the building's main gas service a sign reading "Gas Shut Off". Sign shall be metal with minimum 1-1/2" high-embossed letters.

E. All equipment shall be provided with name plate indicating all pertinent information on it

3.10 PAINTING

A. Paint exposed, exterior metal piping, valves, service regulators, service meters and meter bars, earthquake valves, and piping specialties, except components, with factory-applied paint or protective coating.

1. Alkyd System: MPI EXT 5.1D.

a. Prime Coat: Alkyd anticorrosive metal primer.
b. Intermediate Coat: Exterior alkyd enamel matching topcoat.
c. Topcoat: Exterior alkyd enamel flat.
d. Color: Gray.

B. Damage and Touchup: Repair marred and damaged factory-applied finishes with materials and by procedures to match original factory finish.

3.11 FIELD QUALITY CONTROL

A. Perform tests and inspections.

1. No piping work shall be concealed or covered until piping has been tested, inspected and approved by the Inspector. All piping for plumbing systems shall be completely installed and tested as required by the Uniform Plumbing Code. Test pressures and times indicated are a minimum only. All tests shall be as required by the governing authority as well.

B. Tests and Inspections:

1. Test, inspect, and purge natural gas according to NFPA 54 and authorities having jurisdiction.

C. Natural-gas piping will be considered defective if it does not pass tests and inspections.

D. Prepare test and inspection reports.

3.12 DEMONSTRATION

A. Engage a factory-authorized service representative to train Owner's maintenance personnel to adjust, operate, and maintain earthquake valves.

3.13 OUTDOOR PIPING SCHEDULE

A. Underground natural-gas piping shall be:

1. PE pipe and fittings joined by heat fusion, or mechanical couplings; service-line risers with tracer wire terminated in an accessible location.

B. Aboveground natural-gas piping in exposed locations shall be one of the following:

1. Galvanized steel pipe with galvanized steel malleable-iron fittings and threaded joints.
2. Galvanized steel pipe with galvanized wrought-steel fittings and welded joints.

3.14 INDOOR PIPING SCHEDULE FOR SYSTEM PRESSURES LESS THAN 0.5 PSIG

A. Aboveground piping NPS 2 and smaller shall be the following:

1. Steel pipe with malleable-iron fittings and threaded joints.

B. Aboveground piping NPS 2-1/2 and larger shall be the following:

1. Steel pipe with wrought-steel fittings and welded joints.

3.15 ABOVEGROUND MANUAL GAS SHUTOFF VALVE SCHEDULE

A. Piping valves shall be the following:

1. Two-piece, full-port, bronze ball valves with bronze trim.

END OF SECTION 22 11 23

SECTION 22 13 16 - SANITARY WASTE AND VENT PIPING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section Includes:

1. Pipe, tube, and fittings.
2. Specialty pipe fittings.
3. Encasement for underground metal piping.

B. Related Sections:
1. Section 221313 "Facility Sanitary Sewers" for sanitary sewerage piping and structures outside the building.

1.3 WORK INCLUDED

A. Furnish all labor, materials, services, testing, transportation and equipment necessary for the completion of all plumbing work as indicated on drawings and specified herein. Work materials and equipment not indicated or specified which is necessary for the complete and proper operation of the work of this Section in accordance with the true intent and meaning of the contract documents shall be provided and incorporated at no additional cost to the Owner.

1.4 QUALITY ASSURANCE

A. Code Requirements: All work covered by this Section shall conform to the latest requirements of the following regulations:

1. C.C.R., Title 24, Part 5 (2022 CPC).
2. 2022 California Plumbing Code.
3. SMACNA Seismic Restraint Manual Guidelines for Mechanical Systems.
4. National Fire Protection Association.
5. California State Division of Industrial Safety.
6. County Health Department.
7. Any other legally constituted body-having jurisdiction thereof.

B. Nothing in the specifications or drawings shall be construed to permit deviation from the requirements of governing codes unless approval for said deviation has been obtained from the legally constituted authorities having jurisdiction and from the Owner's representative.

1.5 PERFORMANCE REQUIREMENTS

A. Components and installation shall be capable of withstanding the following minimum working pressure unless otherwise indicated:

1. Soil, Waste, and Vent Piping: 10-foot head of water.

B. Seismic Performance: Soil, waste, and vent piping and support and installation shall withstand the effects of earthquake motions determined according to ASCE/SEI 7.

1.6 DRAWINGS

A. Because of the small-scale drawings, it is not possible to indicate all offsets, fittings and accessories which may be required. The Contractor shall carefully investigate the conditions surrounding installation of his work, furnishing the necessary piping, fittings, valves, traps, and other devices which may be required to complete the installation.

B. The general arrangement indicated on the drawings shall be followed as closely as possible. Coordinate with the Architectural, Structural, Mechanical and Electrical Drawings and the work of other trades prior to installation of piping fixtures and equipment to verify adequate space available for installation of the work shown. In the event a field condition arises which makes it impossible to install the work as indicated, submit, in writing, the proposed departures to the Architect for his approval. Only when Architect's approval is given, in writing, shall Contractor proceed with installation of the work.

C. Special Note: Should the Contractor make changes in the installation differing from what is indicated on the contract drawings and not necessitated due to field conditions as indicated hereinabove, the Contractor shall be required to re-install the work to comply with what has been indicated on the contract drawings. Should it be impossible to re-install the work and the installation is in accordance with all governing authorities, the architect may permit the installation to remain. However, all costs incurred to revise the contract drawings by the engineer for resubmittal to the building department indicating the as-installed condition shall become the responsibility of the Contractor.

D. In case of a difference in the specifications or between the specifications and the drawings, the Contractor shall figure the most expensive alternate and after award of contract, shall secure direction from the Architect.

1.7 PERMITS, INSPECTIONS AND LICENSES

A. All permits, inspections and licenses required by the legally constituted authorities for installation of the work according to the plans and specifications shall be obtained and paid as a part of the work of this section.

1.8 UTILITIES

A. See Drawings for Points of Connection.

B. Certain site utilities are to be connected to and extended. Before laying of any pipe or digging of any trenches, Contractor shall determine by actual excavation and measurement exact location and depth of lines to which he is to connect. In event depth of lines is not sufficient to

permit connection in manner indicated, Contractor shall obtain direction from the Owner's representative before proceeding with this work.

C. Verify that utility companies size their services and meters to suit ultimate demand indicated on the drawings.

D. Sanitary Sewer: The Contractor shall be responsible for the soil and waste piping outside of the building within five feet (5') of the foundation, and within the building itself. See Civil Engineer's plans for onsite sewer system.

1.9 EXAMINATION OF PREMISES

A. Before bidding on this work, Contractors shall make a careful examination of the premises and shall thoroughly familiarize themselves with the requirements of the contract. By the act of submitting a proposal for the work included in this contract, the Contractor shall be deemed to have made such study and examination, and that he is familiar with and accepts all conditions of the site.

1.10 PROTECTION

A. All work, equipment and materials shall be protected at all times. Contractor shall make good all damage caused either directly or indirectly by his own workmen. Contractor shall also protect his own work from damage. He shall close all pipe openings with caps or plugs during installation. He shall protect all his equipment and materials against dirt, water, chemical and mechanical injury. Upon completion, all work shall be thoroughly cleaned and delivered in a new condition.

B. Contractor shall be held responsible for all damage to equipment and materials until he has received written notice from the Architect or Engineer that his work has been accepted.

1.11 LOCATIONS

A. The locations of apparatus, piping and equipment indicated on the drawings are approximate. Piping and equipment shall be installed in such a manner as to avoid all obstruction, preserve headroom, and keep openings and passages clear. The locations of and mounting heights of all fixtures shall be coordinated with the architectural plans and room elevations.

B. Clearances and Openings: Contractor shall cooperate and coordinate his work with all other trades to avoid conflict and permit for a neat and orderly appearance of the entire installation. The Contractor shall, in advance of the work, furnish instructions to the General Contractor as to his requirements for equipment and material installation of any kind, whether or not specifically mentioned on drawings or in the specifications, and shall include recesses, chases in walls, and all required openings in the structure. Should furnishing this information be neglected, delayed or incorrect and additional cuttings are found to be required, the cost of the same shall be charged to this Contractor.

C. Contractor shall verify and coordinate pipe routing with location of all electrical rooms, elevator equipment rooms, telecom/data rooms, and other rooms dedicated to the housing of switchgear, panels, or other electrical equipment. In no case shall piping be installed within or above the ceiling of such rooms.

1.12 SUBMITTAL DATA

A. Submittal Requirements:

1. Furnish, all at one time, prior to any installation, within the time noted below, six (6) copies of valid submittal data on all fixtures, material, equipment and devices. Each submitted item shall be indexed and referenced to these specifications and to identification numbers on fixtures and equipment schedules.
2. Manufacturers' submittal literature and shop drawings are required on all items to ensure the latest and most complete manufacturer's data is available for review. Requirements of the submittals and Engineer's submittal notes are a part of the work of this Division except that Engineer's notes may not be used as a means of increasing the scope of work of this Division.
3. Submittals will be checked for general conformance with the design concept of the project but the review does not guarantee quantities shown and does not supersede requirements of this Division to properly install work.
4. To be valid, all submittals must:

    a. Be delivered to the Architect's office within thirty-five (35) days of award of the contract. Contractor shall make time allowance for Engineer's review, return of comments, if any, and resubmittal if required. Corrections or changes in submittals returned as inadequate or incomplete shall be accomplished within this time limit.
    b. Clearly indicate and label as such any items proposed as substitution for that specified or shown on plans.
    c. Include all pertinent construction, installation, performance and technical data.
    d. Have all product data sheets clearly labeled to indicate the individual items being submitted. In addition, all required options and accessories shall be clearly marked.

        1) Product data sheets corresponding to items indicated on plans shall be clearly labeled with the corresponding fixture or equipment tag number.
        2) Product data sheets corresponding to items indicated in specifications shall be clearly labeled with the specification section, page and item numbers.

    e. Include, for every item which differs in size, configuration, connections, service, accessibility or any other significant way, a drawing to the same (or larger) scale as to the pertinent portions of the contract drawings. In this drawing show a complete layout of the system except that which is identical to the contract drawings, unless the unchanged portions must be shown to indicate such things as clearances. This drawing, together with the contract design drawings must show the complete system as revised to accommodate the proposed alternate.

B. Substitution Requirements:

1. Any items included in submittals and proposed by the Contractor as substitution for that specified or shown on plans shall be submitted within thirty five (35) days of award of the contract. After such time, proposed substitutions shall not be accepted for review, and the Contractor shall submit all items as specified or shown on plans.

    a. For each item proposed as substitution for that specified or shown on plans, copies of product data sheets for the specified item shall be placed side by side with product data sheets for the proposed substitution item within the submittal.

        1) In addition to the Submittal Requirements for labeling listed above, product data sheets for the specified item shall be clearly labeled "SPECIFIED

ITEM, NOT SUBMITTED". Product data sheets for the corresponding proposed substitution item shall be clearly labeled "PROPOSED SUBSTITUTION".

b. Provide calculations and other detailed data justifying how any items proposed as substitution were selected for proposal. Data must be complete enough to permit detailed comparison of every significant characteristic for which the specified item was analyzed during design.

2. It shall be the Contractor's responsibility to provide sufficient information to allow the Engineer to analyze any proposed alternate. If inadequate information is provided, the proposal will not be approved and resubmittal will not be allowed.
3. The Contractor shall provide or perform tests required by Engineer for purpose of judging acceptability of proposed substitutions.
4. The Contractor assumes full responsibility that alternate items and procedures will meet the job requirements and is responsible for cost of redesign and of modifications to this and other parts of work caused by alternate items furnished under work in this Section. In view of these responsibilities, it is the purpose of these specifications to establish procedures to ensure that the Contractor has considered all the ramifications of proposed alternates before submitting them for review. Submittals which do not comply with the requirements of these specifications or which indicate proposed alternates that were selected without proper regard to the requirements of the job will not be approved. No more than one proposed alternate will be considered for each item.
5. Alternate items installed without Engineer's approval will be replaced with specified items at Contractor's expense.

1.13 INFORMATIONAL SUBMITTALS

A. Seismic Qualification Certificates: For waste and vent piping, accessories, and components, from manufacturer.

1. Basis for Certification: Indicate whether withstand certification is based on actual test of assembled components or on calculation.
2. Detailed description of piping anchorage devices on which the certification is based and their installation requirements.

B. Field quality-control reports.

1.14 QUALITY ASSURANCE

A. Piping materials shall bear label, stamp, or other markings of specified testing agency.

B. Comply with NSF/ANSI 14, "Plastics Piping Systems Components and Related Materials," for plastic piping components. Include marking with "NSF-dwv" for plastic drain, waste, and vent piping and "NSF-sewer" for plastic sewer piping.

1.15 PROJECT CONDITIONS

A. Interruption of Existing Sanitary Waste Service: Do not interrupt service to facilities occupied by Owner or others unless permitted under the following conditions and then only after arranging to provide temporary service according to requirements indicated:

1. Notify Architect no fewer than two days in advance of proposed interruption of sanitary waste service.

2. Do not proceed with interruption of sanitary waste service without Architect's written permission.

1.16 UNINSPECTED WORK

A. The Contractor shall not allow or cause any of his work to be covered up or closed in until it has been inspected, tested, approved by all authorities have jurisdiction, and until Project Record drawings have been properly annotated.

B. Should any of his work be covered up or closed in before such inspection, he shall, at his own expense, uncover the work to the satisfaction of the inspection party. All related repair work cost shall be borne by the Contractor.

1.17 RECORD DRAWINGS (Also see General Conditions)

A. Contractor shall provide and keep up-to-date a complete "as-built" record set of blueline prints which shall show every change from the original drawings and the exact "as-built" locations and sizes of the work provided under this Section of the specifications. This set shall include locations, dimensions, depth of buried piping, cleanouts, shut-off valves, sewer invert locations, plugged wyes, tees, etc. On completion of the work, the Contractor shall incorporate all as-built information on a set of reproducible tracings provided by the Architect and this set of reproducibles shall be delivered to the Architect.

1.18 GUARANTEES (Also see General Conditions)

A. Contractor shall guarantee the entire plumbing and piping systems unconditionally for a period of one (1) year after final acceptance. If, during this period, any materials, equipment, or any part of the systems fail to function properly, the Contractor shall make good the defects promptly and without any expense to the Owner.

B. Contractor shall be responsible for all damage to any part of the premises caused by leaks in pipelines or equipment furnished and installed under this Section for a period of one (1) year after date of acceptance of his work.

C. All equipment and fixtures shall carry manufacturer's warranty against defective parts or poor workmanship for not less than one (1) year. See specific equipment specifications for extended warranty requirements.

PART 2 - PRODUCTS

2.1 PIPING MATERIALS

A. Comply with requirements in "Piping Schedule" Article for applications of pipe, tube, fitting materials, and joining methods for specific services, service locations, and pipe sizes.

2.2 HUBLESS, CAST-IRON SOIL PIPE AND FITTINGS

A. Pipe and Fittings: ASTM A 888 or CISPI 301.

B. ASTM C 1540, CISPI, Hubless-Piping Couplings:

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

   a. ANACO-Husky SD 4000 series.
   b. Clamp All HI_TORQ 125 series

2. Standards: ASTM C 1277 and CISPI 310.
3. Description: Stainless-steel corrugated shield with stainless-steel bands and tightening devices; and ASTM C 564, rubber sleeve with integral, center pipe stop.

C. Soil and waste piping within the building itself and outside within five feet (5') of the foundation, shall be no-hub cast iron pipe and fittings, asphaltum coated, free from defects, and shall comply with CISPI. Standard 301, ASTM A-888 or ASTM A-74. Pipe and fittings shall be marked with the collective trademark of the Cast Iron Soil Pipe Institute. Fittings shall be made up with "Husky" SD 4000 series or “Clamp All” HI-TORQ 125 series stainless steel type 304 couplings and shall conform to ASTM C1540 & ASTM C564 except all above ground vent pipe fittings may be made with "Anaco" or "Tyler" stainless steel two band couplings conforming to CISPI Standard 310.

PART 3 - EXECUTION

3.1 EARTH MOVING

A. Comply with requirements for excavating, trenching, and backfilling specified in Section 312000 "Earth Moving."

3.2 PIPING INSTALLATION

A. Drawing plans, schematics, and diagrams indicate general location and arrangement of piping systems. Indicated locations and arrangements were used to size pipe and calculate friction loss, expansion, pump sizing, and other design considerations. Install piping as indicated unless deviations to layout are approved on coordination drawings.

B. Install piping in concealed locations unless otherwise indicated and except in equipment rooms and service areas.

C. Install piping indicated to be exposed and piping in equipment rooms and service areas at right angles or parallel to building walls. Diagonal runs are prohibited unless specifically indicated otherwise.

D. Install piping above accessible ceilings to allow sufficient space for ceiling panel removal.

E. Install piping to permit valve servicing.

F. Install piping at indicated slopes.

G. Install piping free of sags and bends.

H. Install fittings for changes in direction and branch connections.

I. Install piping to allow application of insulation.

J. Install seismic restraints on piping. Comply with requirements for seismic-restraint devices specified in Section 220548 "Vibration and Seismic Controls for Plumbing Piping and Equipment."

K. Make changes in direction for soil and waste drainage and vent piping using appropriate branches, bends, and long-sweep bends. Sanitary tees and short-sweep 1/4 bends may be used on vertical stacks if change in direction of flow is from horizontal to vertical. Use long-turn, double Y-branch and 1/8-bend fittings if two fixtures are installed back to back or side by side with common drain pipe. Straight tees, elbows, and crosses may be used on vent lines. Do not change direction of flow more than 90 degrees. Use proper size of standard increasers and reducers if pipes of different sizes are connected. Reducing size of drainage piping in direction of flow is prohibited.

L. Lay buried building drainage piping beginning at low point of each system. Install true to grades and alignment indicated, with unbroken continuity of invert. Place hub ends of piping upstream. Install required gaskets according to manufacturer's written instructions for use of lubricants, cements, and other installation requirements. Maintain swab in piping and pull past each joint as completed.

M. Install soil and waste drainage and vent piping at the following minimum slopes unless otherwise indicated:

1. Sanitary Drain: 2 percent downward in direction of flow for piping NPS 3 and smaller; 1 percent downward in direction of flow for piping NPS 4 and larger.

2. Vent Piping: 1 percent down toward vertical fixture vent or toward vent stack.

N. Install cast-iron soil piping according to CISPI's "Cast Iron Soil Pipe and Fittings Handbook," Chapter IV, "Installation of Cast Iron Soil Pipe and Fittings."

1. Install encasement on underground piping according to ASTM A 674 or AWWA C105/A 21.5.

O. Plumbing Specialties:

1. Install cleanouts at grade and extend to where building sanitary drains connect to building sanitary sewers in sanitary drainage gravity-flow piping. Install cleanout fitting with closure plug inside the building in sanitary drainage force-main piping. Comply with requirements for cleanouts specified in Section 221319 "Sanitary Waste Piping Specialties."

2. Install drains in sanitary drainage gravity-flow piping. Comply with requirements for drains specified in Section 221319 "Sanitary Waste Piping Specialties."

P. Do not enclose, cover, or put piping into operation until it is inspected and approved by authorities having jurisdiction.

Q. Install sleeves for piping penetrations of walls, ceilings, and floors. Comply with requirements for sleeves specified in Section 220517 "Sleeves and Sleeve Seals for Plumbing Piping."

R. Install sleeve seals for piping penetrations of concrete walls and slabs. Comply with requirements for sleeve seals specified in Section 220517 "Sleeves and Sleeve Seals for Plumbing Piping."

S. Install escutcheons for piping penetrations of walls, ceilings, and floors. Comply with requirements for escutcheons specified in Section 220518 "Escutcheons for Plumbing Piping."

3.3 JOINT CONSTRUCTION

A. Join hubless, cast-iron soil piping according to CISPI 310 and CISPI's "Cast Iron Soil Pipe and Fittings Handbook" for hubless-piping coupling joints.

B. Threaded Joints: Thread pipe with tapered pipe threads according to ASME B1.20.1. Cut threads full and clean using sharp dies. Ream threaded pipe ends to remove burrs and restore full ID. Join pipe fittings and valves as follows:

1. Apply appropriate tape or thread compound to external pipe threads unless dry seal threading is specified.
2. Damaged Threads: Do not use pipe or pipe fittings with threads that are corroded or damaged. Do not use pipe sections that have cracked or open welds.

3.4 HANGER AND SUPPORT INSTALLATION

A. Comply with requirements for seismic-restraint devices specified in Section 220548 "Vibration and Seismic Controls for Plumbing Piping and Equipment."

B. Comply with requirements for pipe hanger and support devices and installation specified in Section 220529 "Hangers and Supports for Plumbing Piping and Equipment."

1. Install carbon-steel pipe hangers for horizontal piping in noncorrosive environments.
2. Install stainless-steel pipe hangers for horizontal piping in corrosive environments.
3. Install carbon-steel pipe support clamps for vertical piping in noncorrosive environments.
4. Install stainless-steel pipe support clamps for vertical piping in corrosive environments.
5. Vertical Piping: MSS Type 8 or Type 42, clamps.
6. Install individual, straight, horizontal piping runs:

a. 100 Feet and Less: MSS Type 1, adjustable, steel clevis hangers.
b. Longer Than 100 Feet: MSS Type 43, adjustable roller hangers.
c. Longer Than 100 Feet if Indicated: MSS Type 49, spring cushion rolls.

7. Multiple, Straight, Horizontal Piping Runs 100 Feet or Longer: MSS Type 44, pipe rolls. Support pipe rolls on trapeze.
8. Base of Vertical Piping: MSS Type 52, spring hangers.

C. Support horizontal piping and tubing within 12 inches of each fitting and coupling.

D. Support vertical piping and tubing at base and at each floor.

E. Rod diameter may be reduced one size for double-rod hangers, with 3/8-inch minimum rods.

F. Install hangers for cast-iron soil piping with the following maximum horizontal spacing and minimum rod diameters:

1. NPS 1-1/2 and NPS 2: 60 inches with 3/8-inch rod.
2. NPS 3: 60 inches with 1/2-inch rod.
3. NPS 4 and NPS 5: 60 inches with 5/8-inch rod.
4. Spacing for 10-foot lengths may be increased to 10 feet. Spacing for fittings is limited to 60 inches.

G. Install supports for vertical cast-iron soil piping every 15 feet.

H. Install hangers for steel piping with the following maximum horizontal spacing and minimum rod diameters:

1. NPS 1-1/4: 84 inches with 3/8-inch rod.
2. NPS 1-1/2: 108 inches with 3/8-inch rod.
3. NPS 2: 10 feet with 3/8-inch rod.
4. NPS 2-1/2: 11 feet with 1/2-inch rod.
5. NPS 3: 12 feet with 1/2-inch rod.
6. NPS 4 and NPS 5: 12 feet with 5/8-inch rod.

I. Support piping and tubing not listed above according to MSS SP-69 and manufacturer's written instructions.

3.5 CONNECTIONS

A. Drawings indicate general arrangement of piping, fittings, and specialties.

B. Connect soil and waste piping to exterior sanitary sewerage piping. Use transition fitting to join dissimilar piping materials.

C. Connect drainage and vent piping to the following:

1. Plumbing Fixtures: Connect drainage piping in sizes indicated, but not smaller than required by plumbing code.
2. Plumbing Fixtures and Equipment: Connect atmospheric vent piping in sizes indicated, but not smaller than required by authorities having jurisdiction.
3. Plumbing Specialties: Connect drainage and vent piping in sizes indicated, but not smaller than required by plumbing code.
4. Install test tees (wall cleanouts) in conductors near floor and floor cleanouts with cover flush with floor.

D. Where installing piping adjacent to equipment, allow space for service and maintenance of equipment.

3.6 IDENTIFICATION

A. Identify exposed sanitary waste and vent piping. Comply with requirements for identification specified in Section 220553 "Identification for Plumbing Piping and Equipment."

3.7 FIELD QUALITY CONTROL

A. During installation, notify authorities having jurisdiction at least 24 hours before inspection must be made. Perform tests specified below in presence of authorities having jurisdiction.

1. Roughing-in Inspection: Arrange for inspection of piping before concealing or closing-in after roughing-in and before setting fixtures.

2. Final Inspection: Arrange for final inspection by authorities having jurisdiction to observe tests specified below and to ensure compliance with requirements.

B. Reinspection: If authorities having jurisdiction find that piping will not pass test or inspection, make required corrections and arrange for reinspection.

C. Reports: Prepare inspection reports and have them signed by authorities having jurisdiction.

D. Test sanitary drainage and vent piping according to procedures of authorities having jurisdiction or, in absence of published procedures, as follows:

1. Test for leaks and defects in new piping and parts of existing piping that have been altered, extended, or repaired. If testing is performed in segments, submit separate report for each test, complete with diagram of portion of piping tested.

2. Leave uncovered and unconcealed new, altered, extended, or replaced drainage and vent piping until it has been tested and approved. Expose work that was covered or concealed before it was tested.

3. Roughing-in Plumbing Test Procedure: Test drainage and vent piping except outside leaders on completion of roughing-in. Close openings in piping system and fill with water to point of overflow, but not less than 10-foot head of water. From 15 minutes before inspection starts to completion of inspection, water level must not drop. Inspect joints for leaks.

4. Finished Plumbing Test Procedure: After plumbing fixtures have been set and traps filled with water, test connections and prove they are gastight and watertight. Plug vent-stack openings on roof and building drains where they leave building. Introduce air into piping system equal to pressure of 1-inch wg. Use U-tube or manometer inserted in trap of water closet to measure this pressure. Air pressure must remain constant without introducing additional air throughout period of inspection. Inspect plumbing fixture connections for gas and water leaks.

5. Repair leaks and defects with new materials and retest piping, or portion thereof, until satisfactory results are obtained.

6. Prepare reports for tests and required corrective action.

3.8 CLEANING AND PROTECTION

A. Clean interior of piping. Remove dirt and debris as work progresses.

B. Protect drains during remainder of construction period to avoid clogging with dirt and debris and to prevent damage from traffic and construction work.

C. Place plugs in ends of uncompleted piping at end of day and when work stops.

3.9 PIPING SCHEDULE

A. Flanges and unions may be used on aboveground pressure piping unless otherwise indicated.

B. Aboveground, soil and waste piping shall be the following:

1. Hubless, cast-iron soil pipe and fittings; heavy-duty hubless-piping couplings; and coupled joints.

C. Aboveground, vent piping shall be the following:

1. Hubless, cast-iron soil pipe and fittings; CISPI hubless-piping couplings; and coupled joints.

D. Underground, soil, waste, and vent piping shall be the following:

1. Hubless, cast-iron soil pipe and fittings; heavy-duty hubless-piping couplings; and coupled joints.

END OF SECTION 22 13 16

SECTION 22 13 19 - SANITARY WASTE PIPING SPECIALTIES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section Includes:

1. Cleanouts.
2. Floor drains.
3. Trench drains.
4. Miscellaneous sanitary drainage piping specialties.
5. Grease interceptors.

B. Related Requirements:

1. Section 221423 "Storm Drainage Piping Specialties" for storm drainage piping inside the building, drainage piping specialties, and drains.
2. Section 224300 "Medical Plumbing Fixtures" for plaster sink interceptors.
3. Section 334100 "Storm Utility Drainage Piping" for storm draining piping and piping specialties outside the building.

1.3 DEFINITIONS

A. ABS: Acrylonitrile-butadiene-styrene plastic.

B. FOG: Fats, oils, and greases.

C. HDPE: High-density polyethylene plastic.

1.4 WORK INCLUDED

A. Furnish all labor, materials, services, testing, transportation and equipment necessary for the completion of all plumbing work as indicated on drawings and specified herein. Work materials and equipment not indicated or specified which is necessary for the complete and proper operation of the work of this Section in accordance with the true intent and meaning of the contract documents shall be provided and incorporated at no additional cost to the Owner.

1.5 QUALITY ASSURANCE

A. Code Requirements: All work covered by this Section shall conform to the latest requirements of the following regulations:

1. C.C.R., Title 24, Part 5 (2022 CPC).
2. 2022 California Plumbing Code.
3. SMACNA Seismic Restraint Manual Guidelines for Mechanical Systems.
4. National Fire Protection Association.
5. California State Division of Industrial Safety.
6. County Health Department.
7. Any other legally constituted body-having jurisdiction thereof.

B. Nothing in the specifications or drawings shall be construed to permit deviation from the requirements of governing codes unless approval for said deviation has been obtained from the legally constituted authorities having jurisdiction and from the Owner's representative.

1.6 PERFORMANCE REQUIREMENTS

A. Components and installation shall be capable of withstanding the following minimum working pressure unless otherwise indicated:

1. Soil, Waste, and Vent Piping: 10-foot head of water.

B. Seismic Performance: Soil, waste, and vent piping and support and installation shall withstand the effects of earthquake motions determined according to ASCE/SEI 7.

1.7 DRAWINGS

A. Because of the small-scale drawings, it is not possible to indicate all offsets, fittings and accessories which may be required. The Contractor shall carefully investigate the conditions surrounding installation of his work, furnishing the necessary piping, fittings, valves, traps, and other devices which may be required to complete the installation.

B. The general arrangement indicated on the drawings shall be followed as closely as possible. Coordinate with the Architectural, Structural, Mechanical and Electrical Drawings and the work of other trades prior to installation of piping fixtures and equipment to verify adequate space available for installation of the work shown. In the event a field condition arises which makes it impossible to install the work as indicated, submit, in writing, the proposed departures to the Architect for his approval. Only when Architect's approval is given, in writing, shall Contractor proceed with installation of the work.

C. Special Note: Should the Contractor make changes in the installation differing from what is indicated on the contract drawings and not necessitated due to field conditions as indicated hereinabove, the Contractor shall be required to re-install the work to comply with what has been indicated on the contract drawings. Should it be impossible to re-install the work and the installation is in accordance with all governing authorities, the architect may permit the installation to remain. However, all costs incurred to revise the contract drawings by the engineer for resubmittal to the building department indicating the as-installed condition shall become the responsibility of the Contractor.

D. In case of a difference in the specifications or between the specifications and the drawings, the Contractor shall figure the most expensive alternate and after award of contract, shall secure direction from the Architect.

1.8 PERMITS, INSPECTIONS AND LICENSES

A. All permits, inspections and licenses required by the legally constituted authorities for installation of the work according to the plans and specifications shall be obtained and paid as a part of the work of this section.

1.9 EXAMINATION OF PREMISES

A. Before bidding on this work, Contractors shall make a careful examination of the premises and shall thoroughly familiarize themselves with the requirements of the contract. By the act of submitting a proposal for the work included in this contract, the Contractor shall be deemed to have made such study and examination, and that he is familiar with and accepts all conditions of the site.

1.10 PROTECTION

A. All work, equipment and materials shall be protected at all times. Contractor shall make good all damage caused either directly or indirectly by his own workmen. Contractor shall also protect his own work from damage. He shall close all pipe openings with caps or plugs during installation. He shall protect all his equipment and materials against dirt, water, chemical and mechanical injury. Upon completion, all work shall be thoroughly cleaned and delivered in a new condition.

B. Contractor shall be held responsible for all damage to equipment and materials until he has received written notice from the Architect or Engineer that his work has been accepted.

1.11 LOCATIONS

A. The locations of apparatus, piping and equipment indicated on the drawings are approximate. Piping and equipment shall be installed in such a manner as to avoid all obstruction, preserve headroom, and keep openings and passages clear. The locations of and mounting heights of all fixtures shall be coordinated with the architectural plans and room elevations.

B. Clearances and Openings: Contractor shall cooperate and coordinate his work with all other trades to avoid conflict and permit for a neat and orderly appearance of the entire installation. The Contractor shall, in advance of the work, furnish instructions to the General Contractor as to his requirements for equipment and material installation of any kind, whether or not specifically mentioned on drawings or in the specifications, and shall include recesses, chases in walls, and all required openings in the structure. Should furnishing this information be neglected, delayed or incorrect and additional cuttings are found to be required, the cost of the same shall be charged to this Contractor.

C. Contractor shall verify and coordinate pipe routing with location of all electrical rooms, elevator equipment rooms, telecom/data rooms, and other rooms dedicated to the housing of switchgear, panels, or other electrical equipment. In no case shall piping be installed within or above the ceiling of such rooms.

1.12 SUBMITTAL DATA

A. Product Data: For each type of product indicated. Include rated capacities, operating characteristics, and accessories for the following:

1. Grease interceptors.

B. Submittal Requirements:

1. Furnish, all at one time, prior to any installation, within the time noted below, six (6) copies of valid submittal data on all fixtures, material, equipment and devices. Each submitted item shall be indexed and referenced to these specifications and to identification numbers on fixtures and equipment schedules.
2. Manufacturers' submittal literature and shop drawings are required on all items to ensure the latest and most complete manufacturer's data is available for review. Requirements of the submittals and Engineer's submittal notes are a part of the work of this Division except that Engineer's notes may not be used as a means of increasing the scope of work of this Division.
3. Submittals will be checked for general conformance with the design concept of the project but the review does not guarantee quantities shown and does not supersede requirements of this Division to properly install work.
4. To be valid, all submittals must:

    a. Be delivered to the Architect's office within thirty-five (35) days of award of the contract. Contractor shall make time allowance for Engineer's review, return of comments, if any, and resubmittal if required. Corrections or changes in submittals returned as inadequate or incomplete shall be accomplished within this time limit.
    b. Clearly indicate and label as such any items proposed as substitution for that specified or shown on plans.
    c. Include all pertinent construction, installation, performance and technical data.
    d. Have all product data sheets clearly labeled to indicate the individual items being submitted. In addition, all required options and accessories shall be clearly marked.

        1) Product data sheets corresponding to items indicated on plans shall be clearly labeled with the corresponding fixture or equipment tag number.
        2) Product data sheets corresponding to items indicated in specifications shall be clearly labeled with the specification section, page and item numbers.

    e. Include, for every item which differs in size, configuration, connections, service, accessibility or any other significant way, a drawing to the same (or larger) scale as to the pertinent portions of the contract drawings. In this drawing show a complete layout of the system except that which is identical to the contract drawings, unless the unchanged portions must be shown to indicate such things as clearances. This drawing, together with the contract design drawings must show the complete system as revised to accommodate the proposed alternate.

C. Substitution Requirements:

1. Any items included in submittals and proposed by the Contractor as substitution for that specified or shown on plans shall be submitted within thirty five (35) days of award of the contract. After such time, proposed substitutions shall not be accepted for review, and the Contractor shall submit all items as specified or shown on plans.

    a. For each item proposed as substitution for that specified or shown on plans, copies of product data sheets for the specified item shall be placed side by side with product data sheets for the proposed substitution item within the submittal.

1) In addition to the Submittal Requirements for labeling listed above, product data sheets for the specified item shall be clearly labeled “SPECIFIED ITEM, NOT SUBMITTED”. Product data sheets for the corresponding proposed substitution item shall be clearly labeled “PROPOSED SUBSTITUTION”.

b. Provide calculations and other detailed data justifying how any items proposed as substitution were selected for proposal. Data must be complete enough to permit detailed comparison of every significant characteristic for which the specified item was analyzed during design.

2. It shall be the Contractor’s responsibility to provide sufficient information to allow the Engineer to analyze any proposed alternate. If inadequate information is provided, the proposal will not be approved and resubmittal will not be allowed.
3. The Contractor shall provide or perform tests required by Engineer for purpose of judging acceptability of proposed substitutions.
4. The Contractor assumes full responsibility that alternate items and procedures will meet the job requirements and is responsible for cost of redesign and of modifications to this and other parts of work caused by alternate items furnished under work in this Section. In view of these responsibilities, it is the purpose of these specifications to establish procedures to ensure that the Contractor has considered all the ramifications of proposed alternates before submitting them for review. Submittals which do not comply with the requirements of these specifications or which indicate proposed alternates that were selected without proper regard to the requirements of the job will not be approved. No more than one proposed alternate will be considered for each item.
5. Alternate items installed without Engineer's approval will be replaced with specified items at Contractor's expense.

1.13 INFORMATIONAL SUBMITTALS

A. Manufacturer Seismic Qualification Certification: Submit certification that grease interceptors, accessories, and components will withstand seismic forces defined in Section 220548 "Vibration and Seismic Controls for Plumbing Piping and Equipment." Include the following:

1. Basis for Certification: Indicate whether withstand certification is based on actual test of assembled components or on calculation.

a. The term "withstand" means "the unit will remain in place without separation of any parts from the device when subjected to the seismic forces specified."
b. The term "withstand" means "the unit will remain in place without separation of any parts from the device when subjected to the seismic forces specified and the unit will be fully operational after the seismic event."

2. Dimensioned Outline Drawings of Equipment Unit: Identify center of gravity and locate and describe mounting and anchorage provisions.
3. Detailed description of equipment anchorage devices on which the certification is based and their installation requirements.

B. Field quality-control reports.

1.14 CLOSEOUT SUBMITTALS

A. Operation and Maintenance Data: For drainage piping specialties to include in emergency, operation, and maintenance manuals.

1.15 QUALITY ASSURANCE

A. Drainage piping specialties shall bear label, stamp, or other markings of specified testing agency.

B. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, Article 100, by a testing agency acceptable to authorities having jurisdiction, and marked for intended use.

C. Comply with NSF 14, "Plastics Piping Components and Related Materials," for plastic sanitary piping specialty components.

1.16 UNINSPECTED WORK

A. The Contractor shall not allow or cause any of his work to be covered up or closed in until it has been inspected, tested, approved by all authorities have jurisdiction, and until Project Record drawings have been properly annotated.

B. Should any of his work be covered up or closed in before such inspection, he shall, at his own expense, uncover the work to the satisfaction of the inspection party. All related repair work cost shall be borne by the Contractor.

1.17 RECORD DRAWINGS (Also see General Conditions)

A. Contractor shall provide and keep up-to-date a complete "as-built" record set of blueline prints which shall show every change from the original drawings and the exact "as-built" locations and sizes of the work provided under this Section of the specifications. This set shall include locations, dimensions, depth of buried piping, cleanouts, shut-off valves, sewer invert locations, plugged wyes, tees, etc. On completion of the work, the Contractor shall incorporate all as-built information on a set of reproducible tracings provided by the Architect and this set of reproducibles shall be delivered to the Architect.

1.18 GUARANTEES

A. Contractor shall guarantee the entire plumbing and piping systems unconditionally for a period of one (1) year after final acceptance. If, during this period, any materials, equipment, or any part of the systems fail to function properly, the Contractor shall make good the defects promptly and without any expense to the Owner.

B. Contractor shall be responsible for all damage to any part of the premises caused by leaks in pipelines or equipment furnished and installed under this Section for a period of one (1) year after date of acceptance of his work.

C. All equipment and fixtures shall carry manufacturer's warranty against defective parts or poor workmanship for not less than one (1) year. See specific equipment specifications for extended warranty requirements.

1.19 COORDINATION

A. Coordinate size and location of concrete bases. Cast anchor-bolt inserts into bases. Concrete, reinforcement, and formwork requirements are specified in Section 033000 "Cast-in-Place Concrete."

B. Coordinate size and location of roof penetrations.

1.20 MAINTENANCE MATERIAL SUBMITTALS

A. Furnish extra materials described below that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.

1. Cultures: Provide 1-gal. bottles of bacteria culture recommended by manufacturer of FOG disposal systems equal to 200 percent of amount installed, but no fewer than 2 1-gal. bottles.

PART 2 - PRODUCTS

2.1 CLEANOUTS

A. Exposed Metal Cleanouts:

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

   a. Zurn
   b. JR Smith
   c. Watts

2. Standard: ASME A112.36.2M for cast iron for cleanout test tee.
3. Size: Same as connected drainage piping
4. Body Material: Hubless, cast-iron soil pipe test tee as required to match connected piping.
5. Closure: Countersunk, brass plug.
6. Closure Plug Size: Same as or not more than one size smaller than cleanout size.

B. Metal Floor Cleanouts:

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

   a. Zurn
   b. JR Smith
   c. Watts

2. Standard: ASME A112.36.2M for cast-iron soil pipe with cast-iron ferrule threaded, adjustable housing cleanout.
3. Size: Same as connected branch.
4. Type: Cast-iron soil pipe with cast-iron ferrule Threaded, adjustable housing.
5. Body or Ferrule: Cast iron.
6. Outlet Connection: Threaded.

7. Closure: Brass plug with tapered threads.
8. Adjustable Housing Material: Cast iron with set-screws or other device.
9. Frame and Cover Material and Finish: Nickel-bronze, copper alloy.
10. Frame and Cover Shape: Round.
11. Top Loading Classification: Heavy Duty.
12. Riser: ASTM A 74, Service class, cast-iron drainage pipe fitting and riser to cleanout.

C. Cast-Iron Wall Cleanouts:

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

   a. Zurn
   b. JR Smith
   c. Watts

2. Standard: ASME A112.36.2M. Include wall access.
3. Size: Same as connected drainage piping.
4. Body: Hubless, cast-iron soil pipe test tee as required to match connected piping.
5. Option for drilled-and-threaded plug in first subparagraph below is for a screw for a wall cover plate.
6. Closure: Countersunk, brass plug.
7. Closure Plug Size: Same as or not more than one size smaller than cleanout size.
8. Wall Access: Round, flat, chrome-plated brass or stainless-steel cover plate with screw.
9. Wall Access: stainless-steel wall-installation frame and cover.

2.2 FLOOR DRAINS

A. Cast-Iron Floor Drains:

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
2. Basis-of-Design Product: Subject to compliance with requirements, provide product indicated on Drawings or comparable product by one of the following:

   a. Zurn
   b. JR Smith
   c. Watts

3. Standard: ASME A112.6.3.
4. Pattern: Floor drain.
5. Body Material: Gray iron.
6. Seepage Flange: Required.
7. Anchor Flange: Required.
8. Clamping Device: Required.
9. Outlet: Bottom.
10. Coating in first subparagraph below is usually used only on sanitary floor drains.
11. Coating on Interior and Exposed Exterior Surfaces: Acid-resistant enamel.
12. Sediment Bucket: Not required.
13. Top or Strainer Material: Nickel bronze.
14. Top of Body and Strainer Finish: Nickel bronze.
15. Top Shape: Round.

B. Stainless-Steel Floor Drains:

1. Manufacturers: Subject to compliance with requirements, provide products by the following:
2. Basis-of-Design Product: Subject to compliance with requirements, provide product indicated on Drawings or comparable product by one of the following:

    a. Josam Company.

3. Standard: ASME A112.3.1.
4. Outlet: Bottom.
5. Top or Strainer Material: Stainless steel.
6. Top Shape: Round.
7. Trap-Primer Connection: Required.

2.3 TRENCH DRAINS

A. Trench Drains:

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
2. Basis-of-Design Product: Subject to compliance with requirements, provide product indicated on Drawings or comparable product by one of the following:

    a. Zurn
    b. JR Smith
    c. Watts

3. Standard: ASME A112.6.3 for trench drains.
4. Material: Ductile or gray iron.
5. Flange: Anchor.
6. Clamping Device: Required.
7. Outlet: Bottom.
8. Grate Material: Ductile iron.
9. Grate Finish: Painted.
10. Top Loading Classification: Medium Duty.

2.4 MISCELLANEOUS SANITARY DRAINAGE PIPING SPECIALTIES

A. Vent Caps:

1. Description: Cast-iron body with threaded or hub inlet and vandal-proof design. Include vented hood and setscrews to secure to vent pipe.
2. Size: Same as connected stack vent or vent stack.

2.5 SAND/OIL INTERCEPTORS

A. Sand/Oil Interceptors:

1. Manufacturers: Subject to compliance with requirements, provide products by the following:
2. Basis-of-Design Product: Subject to compliance with requirements, provide product indicated on Drawings or comparable product by one of the following:

a. Jensen Precast.

3. Standard: ASME A112.14.3 and PDI-G101, for intercepting and retaining fats, oils or -processing wastewater.
4. PDI certification is currently limited to 50-gpm (3.15-L/s) flow rate and 100-lb (45.4-kg) grease retention by PDI-G101. Larger uncertified units are available. PDI-G101 is being revised, should be available by end of 2003, and will include capacities to 100 gpm (6.3 L/s).
5. Plumbing and Drainage Institute Seal: Not required.
6. Rate in subparagraph below is limited to 100 gpm (6.3 L/s).
7. Capacity in first subparagraph below is limited to 200 lb (90.7 kg).
8. Sand/Oil Retention Capacity: 1000 Gallon.
9. Inlet and Outlet Size: 4”
10. Cleanout: Integral or field installed on outlet.
11. Mounting: Recessed, flush with floor.
12. Operation: Manual cleaning.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Equipment Mounting:

1. Install grease interceptors on cast-in-place concrete equipment base(s). Comply with requirements for equipment bases and foundations specified in Section 03 30 00 "Cast-in-Place Concrete." Section 03 30 53 "Miscellaneous Cast-in-Place Concrete."
2. Comply with requirements for vibration isolation and seismic control devices specified in Section 22 05 48 "Vibration and Seismic Controls for Plumbing Piping and Equipment"
3. Comply with requirements for vibration isolation devices specified in Section 22 05 48.13 "Vibration Controls for Plumbing Piping and Equipment."

B. Install cleanouts in aboveground piping and building drain piping according to the following, unless otherwise indicated:

1. Size same as drainage piping up to NPS 4. Use NPS 4 for larger drainage piping unless larger cleanout is indicated.
2. Locate at each change in direction of piping greater than 45 degrees.
3. Locate at minimum intervals of 50 feet for piping NPS 4 and smaller and 100 feet for larger piping.
4. Locate at base of each vertical soil and waste stack.

C. For floor cleanouts for piping below floors, install cleanout deck plates with top flush with finished floor.

D. For cleanouts located in concealed piping, install cleanout wall access covers, of types indicated, with frame and cover flush with finished wall.

E. Install floor drains at low points of surface areas to be drained. Set grates of drains flush with finished floor, unless otherwise indicated.
1. Install floor-drain flashing collar or flange so no leakage occurs between drain and adjoining flooring. Maintain integrity of waterproof membranes where penetrated.
2. Install individual traps for floor drains connected to sanitary building drain, unless otherwise indicated.

F. Install trench drains at low points of surface areas to be drained. Set grates of drains flush with finished surface, unless otherwise indicated.

G. Install roof flashing assemblies on sanitary stack vents and vent stacks that extend through roof.

H. Install flashing fittings on sanitary stack vents and vent stacks that extend through roof.

I. Install through-penetration firestop assemblies in plastic conductors and stacks at floor penetrations.

J. Install floor-drain, trap-seal primer fittings on inlet to floor drains that require trap-seal primer connection.
   1. Exception: Fitting may be omitted if trap has trap-seal primer connection.
   2. Size: Same as floor drain inlet.

K. Install air-gap fittings on draining-type backflow preventers and on indirect-waste piping discharge into sanitary drainage system.

L. Install sleeve flashing device with each riser and stack passing through floors with waterproof membrane.

M. Install vent caps on each vent pipe passing through roof.

N. Install frost-resistant vent terminals on each vent pipe passing through roof. Maintain 1-inch clearance between vent pipe and roof substrate.

O. Install expansion joints on vertical stacks and conductors. Position expansion joints for easy access and maintenance.

P. Install frost-proof vent caps on each vent pipe passing through roof. Maintain 1-inch clearance between vent pipe and roof substrate.

Q. Install grease interceptors, venting according to authorities having jurisdiction and with clear space for servicing.
   1. Flush with Floor Installation: Set unit and extension, if required, with cover flush with finished floor
   2. Install cleanout immediately downstream from interceptors not having integral cleanout on outlet.

R. Install wood-blocking reinforcement for wall-mounting-type specialties.

S. Install traps on plumbing specialty drain outlets. Omit traps on indirect wastes unless trap is indicated.

3.2 CONNECTIONS

A. Comply with requirements in Section 22 13 16 "Sanitary Waste and Vent Piping" for piping installation requirements. Drawings indicate general arrangement of piping, fittings, and specialties.

B. Install piping adjacent to equipment to allow service and maintenance.

C. Grease Interceptors: Connect inlet and outlet to unit, and connect flow-control fitting and vent to unit inlet piping. Install valve on outlet of automatic drawoff-type unit.

D. Ground equipment according to Section 26 05 26 "Grounding and Bonding for Electrical Systems."

E. Connect wiring according to Section 26 05 19 "Low-Voltage Electrical Power Conductors and Cables."

3.3 FLASHING INSTALLATION

A. Fabricate flashing from single piece unless large pans, sumps, or other drainage shapes are required. Join flashing according to the following if required:
   1. Lead Sheets: Burn joints of lead sheets 6.0-lb/sq. ft., 0.0938-inch thickness or thicker. Solder joints of lead sheets 4.0-lb/sq. ft., 0.0625-inch thickness or thinner.
   2. Copper Sheets: Solder joints of copper sheets.

B. Install sheet flashing on pipes, sleeves, and specialties passing through or embedded in floors and roofs with waterproof membrane.
   1. Pipe Flashing: Sleeve type, matching pipe size, with minimum length of 10 inches, and skirt or flange extending at least 8 inches around pipe.
   2. Sleeve Flashing: Flat sheet, with skirt or flange extending at least 8 inches around sleeve.
   3. Embedded Specialty Flashing: Flat sheet, with skirt or flange extending at least 8 inches around specialty.

C. Set flashing on floors and roofs in solid coating of bituminous cement.

D. Secure flashing into sleeve and specialty clamping ring or device.

E. Install flashing for piping passing through roofs with counterflashing or commercially made flashing fittings, according to Section 07 62 00 "Sheet Metal Flashing and Trim."

F. Extend flashing up vent pipe passing through roofs and turn down into pipe, or secure flashing into cast-iron sleeve having calking recess.

G. Fabricate and install flashing and pans, sumps, and other drainage shapes.

3.4 LABELING AND IDENTIFYING

A. Equipment Nameplates and Signs: Install engraved plastic-laminate equipment nameplate or sign on or near each of the following:
   1. Grease interceptors.

B. Distinguish among multiple units, inform operator of operational requirements, indicate safety and emergency precautions, and warn of hazards and improper operations, in addition to identifying unit. Nameplates and signs are specified in Section 22 05 53 "Identification for Plumbing Piping and Equipment."

3.5 FIELD QUALITY CONTROL

A. Perform tests and inspections and prepare test reports.

B. Tests and Inspections:

1. Leak Test: After installation, charge system and test for leaks. Repair leaks and retest until no leaks exist.
2. Test and adjust controls and safeties. Replace damaged and malfunctioning controls and equipment.

3.6 PROTECTION

A. Protect drains during remainder of construction period to avoid clogging with dirt or debris and to prevent damage from traffic or construction work.

B. Place plugs in ends of uncompleted piping at end of each day or when work stops.

3.7 DEMONSTRATION

A. Engage a factory-authorized service representative to train Owner's maintenance personnel to adjust, operate, and maintain grease removal devices. Refer to Section 01 79 00 "Demonstration and Training."

END OF SECTION 22 13 19

SECTION 22 14 13 - STORM DRAIN PIPING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section Includes:

1. Pipe, tube, and fittings.
2. Specialty pipe fittings.
3. Encasement for underground metal piping.

B. Related Sections:

1. Section 221429 "Sump Pumps" for storm drainage pumps.
2. Section 334100 "Storm Utility Drainage Piping" for storm drainage piping outside the building.

1.3 WORK INCLUDED

A. Furnish all labor, materials, services, testing, transportation and equipment necessary for the completion of all plumbing work as indicated on drawings and specified herein. Work materials and equipment not indicated or specified which is necessary for the complete and proper operation of the work of this Section in accordance with the true intent and meaning of the contract documents shall be provided and incorporated at no additional cost to the Owner.

1.4 QUALITY ASSURANCE

A. Code Requirements: All work covered by this Section shall conform to the latest requirements of the following regulations:

1. C.C.R., Title 24, Part 5 (2022 CPC).
2. 2022 California Plumbing Code.
3. SMACNA Seismic Restraint Manual Guidelines for Mechanical Systems.
4. National Fire Protection Association.
5. California State Division of Industrial Safety.
6. County Health Department.
7. Any other legally constituted body-having jurisdiction thereof.

B. Nothing in the specifications or drawings shall be construed to permit deviation from the requirements of governing codes unless approval for said deviation has been obtained from the legally constituted authorities having jurisdiction and from the Owner's representative.

1.5 PERFORMANCE REQUIREMENTS

A. Components and installation shall be capable of withstanding the following minimum working pressure unless otherwise indicated:

1. Storm Drainage Piping: 10-foot head of water.
2. Storm Drainage, Force-Main Piping: 150 psig.

B. Seismic Performance: Storm drainage piping and support and installation shall withstand the effects of earthquake motions determined according to ASCE/SEI 7.

1.6 DRAWINGS

A. Because of the small-scale drawings, it is not possible to indicate all offsets, fittings and accessories which may be required. The Contractor shall carefully investigate the conditions surrounding installation of his work, furnishing the necessary piping, fittings, valves, traps, and other devices which may be required to complete the installation.

B. The general arrangement indicated on the drawings shall be followed as closely as possible. Coordinate with the Architectural, Structural, Mechanical and Electrical Drawings and the work of other trades prior to installation of piping fixtures and equipment to verify adequate space available for installation of the work shown. In the event a field condition arises which makes it impossible to install the work as indicated, submit, in writing, the proposed departures to the Architect for his approval. Only when Architect's approval is given, in writing, shall Contractor proceed with installation of the work.

C. Special Note: Should the Contractor make changes in the installation differing from what is indicated on the contract drawings and not necessitated due to field conditions as indicated hereinabove, the Contractor shall be required to re-install the work to comply with what has been indicated on the contract drawings. Should it be impossible to re-install the work and the installation is in accordance with all governing authorities, the architect may permit the installation to remain. However, all costs incurred to revise the contract drawings by the engineer for resubmittal to the building department indicating the as-installed condition shall become the responsibility of the Contractor.

D. In case of a difference in the specifications or between the specifications and the drawings, the Contractor shall figure the most expensive alternate and after award of contract, shall secure direction from the Architect.

1.7 PERMITS, INSPECTIONS AND LICENSES

A. All permits, inspections and licenses required by the legally constituted authorities for installation of the work according to the plans and specifications shall be obtained and paid as a part of the work of this section.

1.8 UTILITIES

A. See Drawings for Points of Connection.

B. Certain site utilities are to be connected to and extended. Before laying of any pipe or digging of any trenches, Contractor shall determine by actual excavation and measurement exact location and depth of lines to which he is to connect. In event depth of lines is not sufficient to permit connection in manner indicated, Contractor shall obtain direction from the Owner's

representative before proceeding with this work.

C. Verify that utility companies size their services and meters to suit ultimate demand indicated on the drawings.

D. Storm Drain: The Contractor shall be responsible for the storm drain service outside of the building within five feet (5') of the foundation, and within the building itself. See Civil Engineer's plans for onsite storm drain system.

1.9 EXAMINATION OF PREMISES

A. Before bidding on this work, Contractors shall make a careful examination of the premises and shall thoroughly familiarize themselves with the requirements of the contract. By the act of submitting a proposal for the work included in this contract, the Contractor shall be deemed to have made such study and examination, and that he is familiar with and accepts all conditions of the site.

1.10 PROTECTION

A. All work, equipment and materials shall be protected at all times. Contractor shall make good all damage caused either directly or indirectly by his own workmen. Contractor shall also protect his own work from damage. He shall close all pipe openings with caps or plugs during installation. He shall protect all his equipment and materials against dirt, water, chemical and mechanical injury. Upon completion, all work shall be thoroughly cleaned and delivered in a new condition.

B. Contractor shall be held responsible for all damage to equipment and materials until he has received written notice from the Architect or Engineer that his work has been accepted.

1.11 LOCATIONS

A. The locations of apparatus, piping and equipment indicated on the drawings are approximate. Piping and equipment shall be installed in such a manner as to avoid all obstruction, preserve headroom, and keep openings and passages clear. The locations of and mounting heights of all fixtures shall be coordinated with the architectural plans and room elevations.

B. Clearances and Openings: Contractor shall cooperate and coordinate his work with all other trades to avoid conflict and permit for a neat and orderly appearance of the entire installation. The Contractor shall, in advance of the work, furnish instructions to the General Contractor as to his requirements for equipment and material installation of any kind, whether or not specifically mentioned on drawings or in the specifications, and shall include recesses, chases in walls, and all required openings in the structure. Should furnishing this information be neglected, delayed or incorrect and additional cuttings are found to be required, the cost of the same shall be charged to this Contractor.

C. Contractor shall verify and coordinate pipe routing with location of all electrical rooms, elevator equipment rooms, telecom/data rooms, and other rooms dedicated to the housing of switchgear, panels, or other electrical equipment. In no case shall piping be installed within or above the ceiling of such rooms.

1.12 SUBMITTAL DATA

A. Submittal Requirements:

1. Furnish, all at one time, prior to any installation, within the time noted below, six (6) copies of valid submittal data on all fixtures, material, equipment and devices. Each submitted item shall be indexed and referenced to these specifications and to identification numbers on fixtures and equipment schedules.
2. Manufacturers' submittal literature and shop drawings are required on all items to ensure the latest and most complete manufacturer's data is available for review. Requirements of the submittals and Engineer's submittal notes are a part of the work of this Division except that Engineer's notes may not be used as a means of increasing the scope of work of this Division.
3. Submittals will be checked for general conformance with the design concept of the project but the review does not guarantee quantities shown and does not supersede requirements of this Division to properly install work.
4. To be valid, all submittals must:

    a. Be delivered to the Architect's office within thirty-five (35) days of award of the contract. Contractor shall make time allowance for Engineer's review, return of comments, if any, and resubmittal if required. Corrections or changes in submittals returned as inadequate or incomplete shall be accomplished within this time limit.
    b. Clearly indicate and label as such any items proposed as substitution for that specified or shown on plans.
    c. Include all pertinent construction, installation, performance and technical data.
    d. Have all product data sheets clearly labeled to indicate the individual items being submitted. In addition, all required options and accessories shall be clearly marked.

        1) Product data sheets corresponding to items indicated on plans shall be clearly labeled with the corresponding fixture or equipment tag number.
        2) Product data sheets corresponding to items indicated in specifications shall be clearly labeled with the specification section, page and item numbers.

    e. Include, for every item which differs in size, configuration, connections, service, accessibility or any other significant way, a drawing to the same (or larger) scale as to the pertinent portions of the contract drawings. In this drawing show a complete layout of the system except that which is identical to the contract drawings, unless the unchanged portions must be shown to indicate such things as clearances. This drawing, together with the contract design drawings must show the complete system as revised to accommodate the proposed alternate.

B. Substitution Requirements:

1. Any items included in submittals and proposed by the Contractor as substitution for that specified or shown on plans shall be submitted within thirty five (35) days of award of the contract. After such time, proposed substitutions shall not be accepted for review, and the Contractor shall submit all items as specified or shown on plans.

    a. For each item proposed as substitution for that specified or shown on plans, copies of product data sheets for the specified item shall be placed side by side with product data sheets for the proposed substitution item within the submittal.

        1) In addition to the Submittal Requirements for labeling listed above, product data sheets for the specified item shall be clearly labeled "SPECIFIED

ITEM, NOT SUBMITTED". Product data sheets for the corresponding proposed substitution item shall be clearly labeled "PROPOSED SUBSTITUTION".

b. Provide calculations and other detailed data justifying how any items proposed as substitution were selected for proposal. Data must be complete enough to permit detailed comparison of every significant characteristic for which the specified item was analyzed during design.

2. It shall be the Contractor's responsibility to provide sufficient information to allow the Engineer to analyze any proposed alternate. If inadequate information is provided, the proposal will not be approved and resubmittal will not be allowed.
3. The Contractor shall provide or perform tests required by Engineer for purpose of judging acceptability of proposed substitutions.
4. The Contractor assumes full responsibility that alternate items and procedures will meet the job requirements and is responsible for cost of redesign and of modifications to this and other parts of work caused by alternate items furnished under work in this Section. In view of these responsibilities, it is the purpose of these specifications to establish procedures to ensure that the Contractor has considered all the ramifications of proposed alternates before submitting them for review. Submittals which do not comply with the requirements of these specifications or which indicate proposed alternates that were selected without proper regard to the requirements of the job will not be approved. No more than one proposed alternate will be considered for each item.
5. Alternate items installed without Engineer's approval will be replaced with specified items at Contractor's expense.

1.13 INFORMATIONAL SUBMITTALS

A. Seismic Qualification Certificates: For storm drainage piping, accessories, and components, from manufacturer.

1. Basis for Certification: Indicate whether withstand certification is based on actual test of assembled components or on calculation.
2. Detailed description of equipment anchorage devices on which the certification is based and their installation requirements.

B. Field quality-control reports.

1.14 QUALITY ASSURANCE

A. Piping materials shall bear label, stamp, or other markings of specified testing agency.

B. Comply with NSF/ANSI 14, "Plastics Piping System Components and Related Materials," for plastic piping components. Include marking with "NSF-drain" for plastic drain piping and "NSF-sewer" for plastic sewer piping.

1.15 PROJECT CONDITIONS

A. Interruption of Existing Storm-Drainage Service: Do not interrupt service to facilities occupied by Owner or others unless permitted under the following conditions and then only after arranging to provide temporary service according to requirements indicated:

1. Notify Architect no fewer than two days in advance of proposed interruption of storm-drainage service.
2. Do not proceed with interruption of storm-drainage service without Architect's written permission.

PART 2 - PRODUCTS

2.1 PIPING MATERIALS

A. Comply with requirements in "Piping Schedule" Article for applications of pipe, tube, fitting materials, and joining methods for specific services, service locations, and pipe sizes.

B. Storm Drain Piping:

1. Concealed storm drain piping within the building itself and outside within five feet (5') of the foundation, shall be no-hub cast iron pipe and fittings, asphaltum coated, free from defects, and shall comply with CISPI. Standard 301, ASTM A-888 or ASTM A-74. Pipe and fittings shall be marked with the collective trademark of the Cast Iron Soil Pipe Institute. Fittings shall be made up with "Husky" SD 4000 series or “Clamp All” HI-TORQ 125 series stainless steel type 304 couplings and shall conform to ASTM C 1540 & ASTM C564.
2. Exposed storm drain piping shall be Schedule 40 galvanized steel pipe, ASTM A53, with black cast iron recessed drainage fittings.

C. Sub-soil Drainage System:

1. Piping: PVC, SDR-35 perforated pipe with solid wall fittings and solvent-cemented joints. Perforations shall be 1/4" diameter on 3" centers, 120 degrees between two rows parallel to pipe axis. Install per pipe manufacturer's directions.

2.2 HUBLESS, CAST-IRON SOIL PIPE AND FITTINGS

A. Pipe and Fittings: ASTM A 888 or CISPI 301.

B. CISPI, Hubless-Piping Couplings:

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

   a. ANACO-Husky SD 4000 series.
   b. Clamp All HI_TORQ 125 series.

2. Standards: ASTM C 1277 and CISPI 310.
3. Description: Stainless-steel corrugated shield with stainless-steel bands and tightening devices; and ASTM C 564, rubber sleeve with integral, center pipe stop.

2.3 ENCASEMENT FOR UNDERGROUND METAL PIPING

A. Standard: ASTM A 674 or AWWA C105.

B. Material: High-density, crosslaminated PE film of 0.004-inch or LLDPE film of 0.008-inch minimum thickness.

C. Form: Tube.

D. Color: Black.

PART 3 - EXECUTION

3.1 EARTH MOVING

A. Comply with requirements for excavating, trenching, and backfilling specified in Section 312000 "Earth Moving."

3.2 PIPING INSTALLATION

A. Drawing plans, schematics, and diagrams indicate general location and arrangement of piping systems. Indicated locations and arrangements were used to size pipe and calculate friction loss, expansion, pump sizing, and other design considerations. Install piping as indicated unless deviations from layout are approved on coordination drawings.

B. Install piping in concealed locations unless otherwise indicated and except in equipment rooms and service areas.

C. Install piping indicated to be exposed and piping in equipment rooms and service areas at right angles or parallel to building walls. Diagonal runs are prohibited unless specifically indicated otherwise.

D. Install piping above accessible ceilings to allow sufficient space for ceiling panel removal.

E. Install piping to permit valve servicing.

F. Install piping at indicated slopes.

G. Install piping free of sags and bends.

H. Install fittings for changes in direction and branch connections.

I. Install piping to allow application of insulation.

J. Install seismic restraints on piping. Comply with requirements for seismic-restraint devices specified in Section 220548 "Vibration and Seismic Controls for Plumbing Piping and Equipment."

K. Make changes in direction for storm drainage piping using appropriate branches, bends, and long-sweep bends. Do not change direction of flow more than 90 degrees. Use proper size of standard increasers and reducers if pipes of different sizes are connected. Reducing size of drainage piping in direction of flow is prohibited.

L. Lay buried building storm drainage piping beginning at low point of each system. Install true to grades and alignment indicated, with unbroken continuity of invert. Place hub ends of piping upstream. Install required gaskets according to manufacturer's written instructions for use of

lubricants, cements, and other installation requirements. Maintain swab in piping and pull past each joint as completed.

M. Install storm drainage piping at the following minimum slopes unless otherwise indicated:

1. Building Storm Drain: 1% downward in direction of flow for piping NPS 3 and smaller; 1% downward in direction of flow for piping NPS 4 and larger unless noted otherwise on drawings.
2. Horizontal Storm-Drainage Piping: 1% downward in direction of flow unless noted otherwise on drawings.

N. Install cast-iron soil piping according to CISPI's "Cast Iron Soil Pipe and Fittings Handbook," Chapter IV, "Installation of Cast Iron Soil Pipe and Fittings."

1. Install encasement on underground piping according to ASTM A 674 or AWWA C105.

O. Install steel piping according to applicable plumbing code.

P. Install aboveground copper tubing according to CDA's "Copper Tube Handbook."

Q. Install aboveground ABS piping according to ASTM D 2661.

R. Install aboveground PVC piping according to ASTM D 2665.

S. Install engineered siphonic drain specialties and storm drainage piping in locations indicated.

T. Install underground, ductile-iron, force-main piping according to AWWA C600. Install buried piping inside building between wall and floor penetrations and connection to storm sewer piping outside building with restrained joints. Anchor pipe to wall or floor. Install thrust-block supports at vertical and horizontal offsets.

1. Install encasement on piping according to ASTM A 674 or AWWA C105.

U. Install underground, copper, force-main tubing according to CDA's "Copper Tube Handbook."

1. Install encasement on piping according to ASTM A 674 or AWWA C105.

V. Install force mains at elevations indicated.

W. Plumbing Specialties:

1. Install backwater valves in storm drainage gravity-flow piping. Comply with requirements for backwater valves specified in Section 221423 "Storm Drainage Piping Specialties."
2. Install cleanouts at grade and extend to where building storm drains connect to building storm sewers in storm drainage gravity-flow piping. Install cleanout fitting with closure plug inside the building in storm drainage force-main piping. Comply with requirements for cleanouts specified in Section 221423 "Storm Drainage Piping Specialties."
3. Install drains in storm drainage gravity-flow piping. Comply with requirements for drains specified in Section 221423 "Storm Drainage Piping Specialties."

X. Do not enclose, cover, or put piping into operation until it is inspected and approved by authorities having jurisdiction.

Y. Install sleeves for piping penetrations of walls, ceilings, and floors. Comply with requirements for sleeves specified in Section 220517 "Sleeves and Sleeve Seals for Plumbing Piping."

Z. Install sleeve seals for piping penetrations of concrete walls and slabs. Comply with requirements for sleeve seals specified in Section 220517 "Sleeves and Sleeve Seals for Plumbing Piping."

AA. Install escutcheons for piping penetrations of walls, ceilings, and floors. Comply with requirements for escutcheons specified in Section 220518 "Escutcheons for Plumbing Piping."

3.3 JOINT CONSTRUCTION

A. Hub-and-Spigot, Cast-Iron Soil Piping Gasketed Joints: Join according to CISPI's "Cast Iron Soil Pipe and Fittings Handbook" for compression joints.

B. Hub-and-Spigot, Cast-Iron Soil Piping Calked Joints: Join according to CISPI's "Cast Iron Soil Pipe and Fittings Handbook" for lead-and-oakum calked joints.

C. Hubless, Cast-Iron Soil Piping Coupled Joints: Join according to CISPI 310 and CISPI's "Cast Iron Soil Pipe and Fittings Handbook" for hubless-piping coupling joints.

D. Threaded Joints: Thread pipe with tapered pipe threads according to ASME B1.20.1. Cut threads full and clean using sharp dies. Ream threaded pipe ends to remove burrs and restore full ID. Join pipe fittings and valves as follows:

1. Apply appropriate tape or thread compound to external pipe threads unless dry seal threading is specified.
2. Damaged Threads: Do not use pipe or pipe fittings with threads that are corroded or damaged. Do not use pipe sections that have cracked or open welds.

E. Join copper tube and fittings with soldered joints according to ASTM B 828 procedure. Use ASTM B 813, water-flushable, lead-free flux and ASTM B 32, lead-free-alloy solder.

F. Grooved Joints: Cut groove ends of pipe according to AWWA C606. Lubricate and install gasket over ends of pipes or pipe and fittings. Install coupling housing sections, over gasket, with keys seated in piping grooves. Install and tighten housing bolts.

G. Flanged Joints: Align bolt holes. Select appropriate gasket material, size, type, and thickness. Install gasket concentrically positioned. Use suitable lubricants on bolt threads. Torque bolts in cross pattern.

H. Plastic, Nonpressure-Piping, Solvent-Cemented Joints: Clean and dry joining surfaces. Join pipe and fittings according to the following:

1. Comply with ASTM F 402 for safe-handling practice of cleaners, primers, and solvent cements.
2. .

3.4 VALVE INSTALLATION

A. General valve installation requirements are specified in Section 220523 "General-Duty Valves for Plumbing Piping."

B. Shutoff Valves: Install shutoff valve on each sump pump discharge.

1. Install gate or full-port ball valve for piping NPS 2 and smaller.

2. Install gate valve for piping NPS 2-1/2 and larger.

C. Check Valves: Install swing-check valve, between pump and shutoff valve, on each sump pump discharge.

D. Backwater Valves: Install backwater valves in piping subject to backflow.

1. Horizontal Piping: Horizontal backwater valves. Use normally closed type unless otherwise indicated.
2. Install backwater valves in accessible locations.
3. Comply with requirements for backwater valves specified in Section 221423 "Storm Drainage Piping Specialties."

3.5 HANGER AND SUPPORT INSTALLATION

A. Comply with requirements for seismic-restraint devices specified in Section 220548 "Vibration and Seismic Controls for Plumbing Piping and Equipment."

B. Comply with requirements for pipe hanger and support devices and installation specified in Section 220529 "Hangers and Supports for Plumbing Piping and Equipment."

1. Install carbon-steel pipe hangers for horizontal piping in noncorrosive environments.
2. Install stainless-steel pipe hangers for horizontal piping in corrosive environments.
3. Install carbon-steel pipe support clamps for vertical piping in noncorrosive environments.
4. Install stainless-steel pipe support clamps for vertical piping in corrosive environments.
5. Vertical Piping: MSS Type 8 or Type 42, clamps.
6. Individual, Straight, Horizontal Piping Runs:

   a. 100 Feet and Less: MSS Type 1, adjustable, steel clevis hangers.
   b. Longer Than 100 Feet: MSS Type 43, adjustable roller hangers.
   c. Longer Than 100 Feet if Indicated: MSS Type 49, spring cushion rolls.

7. Multiple, Straight, Horizontal Piping Runs 100 Feet or Longer: MSS Type 44, pipe rolls. Support pipe rolls on trapeze.
8. Base of Vertical Piping: MSS Type 52, spring hangers.

C. Support horizontal piping and tubing within 12 inches of each fitting, valve, and coupling.

D. Support vertical piping and tubing at base and at each floor.

E. Rod diameter may be reduced one size for double-rod hangers, with 3/8-inch minimum rods.

F. Install hangers for cast-iron soil piping with the following maximum horizontal spacing and minimum rod diameters:

1. NPS 1-1/2 and NPS 2: 60 inches with 3/8-inch rod.
2. NPS 3: 60 inches with 1/2-inch rod.
3. NPS 4 and NPS 5: 60 inches with 5/8-inch rod.
4. NPS 6 and NPS 8: 60 inches with 3/4-inch rod.
5. NPS 10 and NPS 12: 60 inches with 7/8-inch rod.
6. Spacing for 10-foot pipe lengths may be increased to 10 feet. Spacing for fittings is limited to 60 inches.

G. Install supports for vertical cast-iron soil piping every 15 feet.

H. Install supports for vertical copper tubing every 10 feet.

I. Support piping and tubing not listed above according to MSS SP-69 and manufacturer's written instructions.

3.6 CONNECTIONS

A. Drawings indicate general arrangement of piping, fittings, and specialties.

B. Connect interior storm drainage piping to exterior storm drainage piping. Use transition fitting to join dissimilar piping materials.

C. Connect storm drainage piping to roof drains and storm drainage specialties.

1. Install test tees (wall cleanouts) in conductors near floor, and floor cleanouts with cover flush with floor.
2. Install horizontal backwater valves with cleanout cover flush with floor.
3. Comply with requirements for backwater valves cleanouts and drains specified in Section 221423 "Storm Drainage Piping Specialties."

D. Connect force-main piping to the following:

1. Storm Sewer: To exterior force main.
2. Sump Pumps: To sump pump discharge.

E. Where installing piping adjacent to equipment, allow space for service and maintenance of equipment.

F. Make connections according to the following unless otherwise indicated:

1. Install unions, in piping NPS 2 and smaller, adjacent to each valve and at final connection to each piece of equipment.
2. Install flanges, in piping NPS 2-1/2 and larger, adjacent to flanged valves and at final connection to each piece of equipment.

3.7 IDENTIFICATION

A. Identify exposed storm drainage piping. Comply with requirements for identification specified in Section 220553 "Identification for Plumbing Piping and Equipment."

3.8 FIELD QUALITY CONTROL

A. During installation, notify authorities having jurisdiction at least 24 hours before inspection must be made. Perform tests specified below in presence of authorities having jurisdiction.

1. Roughing-in Inspection: Arrange for inspection of piping before concealing or closing-in after roughing-in.
2. Final Inspection: Arrange for final inspection by authorities having jurisdiction to observe tests specified below and to ensure compliance with requirements.

B. Reinspection: If authorities having jurisdiction find that piping will not pass test or inspection, make required corrections and arrange for reinspection.

C. Reports: Prepare inspection reports and have them signed by authorities having jurisdiction.

D. Test storm drainage piping according to procedures of authorities having jurisdiction or, in absence of published procedures, as follows:

1. Test for leaks and defects in new piping and parts of existing piping that have been altered, extended, or repaired. If testing is performed in segments, submit separate report for each test, complete with diagram of portion of piping tested.
2. Leave uncovered and unconcealed new, altered, extended, or replaced storm drainage piping until it has been tested and approved. Expose work that was covered or concealed before it was tested.
3. Test Procedure: Test storm drainage piping on completion of roughing-in. Close openings in piping system and fill with water to point of overflow, but not less than 10-foot head of water. From 15 minutes before inspection starts until completion of inspection, water level must not drop. Inspect joints for leaks.
4. Repair leaks and defects with new materials and retest piping, or portion thereof, until satisfactory results are obtained.
5. Prepare reports for tests and required corrective action.

E. Test force-main piping according to procedures of authorities having jurisdiction or, in absence of published procedures, as follows:

1. Leave uncovered and unconcealed new, altered, extended, or replaced force-main piping until it has been tested and approved. Expose work that was covered or concealed before it was tested.
2. Cap and subject piping to static-water pressure of 50 psig above operating pressure, without exceeding pressure rating of piping system materials. Isolate test source and allow to stand for four hours. Leaks and loss in test pressure constitute defects that must be repaired.
3. Repair leaks and defects with new materials and retest piping, or portion thereof, until satisfactory results are obtained.
4. Prepare reports for tests and required corrective action.

3.9 CLEANING

A. Clean interior of piping. Remove dirt and debris as work progresses.

B. Protect drains during remainder of construction period to avoid clogging with dirt and debris and to prevent damage from traffic and construction work.

C. Place plugs in ends of uncompleted piping at end of day and when work stops.

END OF SECTION 22 14 13

SECTION 22 14 23 - STROM DRAIN PIPING SPECIALTIES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section Includes:

1. Roof drains.
2. Miscellaneous storm drainage piping specialties.
3. Cleanouts.
4. Flashing materials.

1.3 WORK INCLUDED

A. Furnish all labor, materials, services, testing, transportation and equipment necessary for the completion of all plumbing work as indicated on drawings and specified herein. Work materials and equipment not indicated or specified which is necessary for the complete and proper operation of the work of this Section in accordance with the true intent and meaning of the contract documents shall be provided and incorporated at no additional cost to the Owner.

1.4 QUALITY ASSURANCE

A. Code Requirements: All work covered by this Section shall conform to the latest requirements of the following regulations:

1. C.C.R., Title 24, Part 5 (2022 CPC).
2. 2022 California Plumbing Code.
3. SMACNA Seismic Restraint Manual Guidelines for Mechanical Systems.
4. National Fire Protection Association.
5. California State Division of Industrial Safety.
6. County Health Department.
7. Any other legally constituted body-having jurisdiction thereof.

B. Nothing in the specifications or drawings shall be construed to permit deviation from the requirements of governing codes unless approval for said deviation has been obtained from the legally constituted authorities having jurisdiction and from the Owner's representative.

1.5 PERFORMANCE REQUIREMENTS

A. Components and installation shall be capable of withstanding the following minimum working pressure unless otherwise indicated:

1. Storm Drainage Piping: 10-foot head of water.
2. Storm Drainage, Force-Main Piping: 150 psig.

B. Seismic Performance: Storm drainage piping and support and installation shall withstand the effects of earthquake motions determined according to ASCE/SEI 7.

1.6 DRAWINGS

A. Because of the small-scale drawings, it is not possible to indicate all offsets, fittings and accessories which may be required. The Contractor shall carefully investigate the conditions surrounding installation of his work, furnishing the necessary piping, fittings, valves, traps, and other devices which may be required to complete the installation.

B. The general arrangement indicated on the drawings shall be followed as closely as possible. Coordinate with the Architectural, Structural, Mechanical and Electrical Drawings and the work of other trades prior to installation of piping fixtures and equipment to verify adequate space available for installation of the work shown. In the event a field condition arises which makes it impossible to install the work as indicated, submit, in writing, the proposed departures to the Architect for his approval. Only when Architect's approval is given, in writing, shall Contractor proceed with installation of the work.

C. Special Note: Should the Contractor make changes in the installation differing from what is indicated on the contract drawings and not necessitated due to field conditions as indicated hereinabove, the Contractor shall be required to re-install the work to comply with what has been indicated on the contract drawings. Should it be impossible to re-install the work and the installation is in accordance with all governing authorities, the architect may permit the installation to remain. However, all costs incurred to revise the contract drawings by the engineer for resubmittal to the building department indicating the as-installed condition shall become the responsibility of the Contractor.

D. In case of a difference in the specifications or between the specifications and the drawings, the Contractor shall figure the most expensive alternate and after award of contract, shall secure direction from the Architect.

1.7 PERMITS, INSPECTIONS AND LICENSES

A. All permits, inspections and licenses required by the legally constituted authorities for installation of the work according to the plans and specifications shall be obtained and paid as a part of the work of this section.

1.8 EXAMINATION OF PREMISES

A. Before bidding on this work, Contractors shall make a careful examination of the premises and shall thoroughly familiarize themselves with the requirements of the contract. By the act of submitting a proposal for the work included in this contract, the Contractor shall be deemed to have made such study and examination, and that he is familiar with and accepts all conditions of the site.

1.9 PROTECTION

A. All work, equipment and materials shall be protected at all times. Contractor shall make good all damage caused either directly or indirectly by his own workmen. Contractor shall also protect his own work from damage. He shall close all pipe openings with caps or plugs during installation. He shall protect all his equipment and materials against dirt, water, chemical and mechanical injury. Upon completion, all work shall be thoroughly cleaned and delivered in a new condition.

B. Contractor shall be held responsible for all damage to equipment and materials until he has received written notice from the Architect or Engineer that his work has been accepted.

1.10 LOCATIONS

A. The locations of apparatus, piping and equipment indicated on the drawings are approximate. Piping and equipment shall be installed in such a manner as to avoid all obstruction, preserve headroom, and keep openings and passages clear. The locations of and mounting heights of all fixtures shall be coordinated with the architectural plans and room elevations.

B. Clearances and Openings: Contractor shall cooperate and coordinate his work with all other trades to avoid conflict and permit for a neat and orderly appearance of the entire installation. The Contractor shall, in advance of the work, furnish instructions to the General Contractor as to his requirements for equipment and material installation of any kind, whether or not specifically mentioned on drawings or in the specifications, and shall include recesses, chases in walls, and all required openings in the structure. Should furnishing this information be neglected, delayed or incorrect and additional cuttings are found to be required, the cost of the same shall be charged to this Contractor.

C. Contractor shall verify and coordinate pipe routing with location of all electrical rooms, elevator equipment rooms, telecom/data rooms, and other rooms dedicated to the housing of switchgear, panels, or other electrical equipment. In no case shall piping be installed within or above the ceiling of such rooms.

1.11 SUBMITTAL DATA

A. Submittal Requirements:

1. Furnish, all at one time, prior to any installation, within the time noted below, six (6) copies of valid submittal data on all fixtures, material, equipment and devices. Each submitted item shall be indexed and referenced to these specifications and to identification numbers on fixtures and equipment schedules.
2. Manufacturers' submittal literature and shop drawings are required on all items to ensure the latest and most complete manufacturer's data is available for review. Requirements of the submittals and Engineer's submittal notes are a part of the work of this Division except that Engineer's notes may not be used as a means of increasing the scope of work of this Division.
3. Submittals will be checked for general conformance with the design concept of the project but the review does not guarantee quantities shown and does not supersede requirements of this Division to properly install work.
4. To be valid, all submittals must:

    a. Be delivered to the Architect's office within thirty-five (35) days of award of the contract. Contractor shall make time allowance for Engineer's review, return of

comments, if any, and resubmittal if required. Corrections or changes in submittals returned as inadequate or incomplete shall be accomplished within this time limit.

b. Clearly indicate and label as such any items proposed as substitution for that specified or shown on plans.

c. Include all pertinent construction, installation, performance and technical data.

d. Have all product data sheets clearly labeled to indicate the individual items being submitted. In addition, all required options and accessories shall be clearly marked.

1) Product data sheets corresponding to items indicated on plans shall be clearly labeled with the corresponding fixture or equipment tag number.

2) Product data sheets corresponding to items indicated in specifications shall be clearly labeled with the specification section, page and item numbers.

e. Include, for every item which differs in size, configuration, connections, service, accessibility or any other significant way, a drawing to the same (or larger) scale as to the pertinent portions of the contract drawings. In this drawing show a complete layout of the system except that which is identical to the contract drawings, unless the unchanged portions must be shown to indicate such things as clearances. This drawing, together with the contract design drawings must show the complete system as revised to accommodate the proposed alternate.

B. Substitution Requirements:

1. Any items included in submittals and proposed by the Contractor as substitution for that specified or shown on plans shall be submitted within thirty five (35) days of award of the contract. After such time, proposed substitutions shall not be accepted for review, and the Contractor shall submit all items as specified or shown on plans.

a. For each item proposed as substitution for that specified or shown on plans, copies of product data sheets for the specified item shall be placed side by side with product data sheets for the proposed substitution item within the submittal.

1) In addition to the Submittal Requirements for labeling listed above, product data sheets for the specified item shall be clearly labeled “SPECIFIED ITEM, NOT SUBMITTED”. Product data sheets for the corresponding proposed substitution item shall be clearly labeled “PROPOSED SUBSTITUTION”.

b. Provide calculations and other detailed data justifying how any items proposed as substitution were selected for proposal. Data must be complete enough to permit detailed comparison of every significant characteristic for which the specified item was analyzed during design.

2. It shall be the Contractor’s responsibility to provide sufficient information to allow the Engineer to analyze any proposed alternate. If inadequate information is provided, the proposal will not be approved and resubmittal will not be allowed.

3. The Contractor shall provide or perform tests required by Engineer for purpose of judging acceptability of proposed substitutions.

4. The Contractor assumes full responsibility that alternate items and procedures will meet the job requirements and is responsible for cost of redesign and of modifications to this and other parts of work caused by alternate items furnished under work in this Section. In view of these responsibilities, it is the purpose of these specifications to establish procedures to ensure that the Contractor has considered all the ramifications of proposed alternates before submitting them for review. Submittals which do not comply with the requirements of these specifications or which indicate proposed alternates that were

selected without proper regard to the requirements of the job will not be approved. No more than one proposed alternate will be considered for each item.

5. Alternate items installed without Engineer's approval will be replaced with specified items at Contractor's expense.

1.12 INFORMATIONAL SUBMITTALS

A. Seismic Qualification Certificates: For storm drainage piping, accessories, and components, from manufacturer.

1. Basis for Certification: Indicate whether withstand certification is based on actual test of assembled components or on calculation.
2. Detailed description of equipment anchorage devices on which the certification is based and their installation requirements.

B. Field quality-control reports.

1.13 QUALITY ASSURANCE

A. Piping materials shall bear label, stamp, or other markings of specified testing agency.

B. Comply with NSF/ANSI 14, "Plastics Piping System Components and Related Materials," for plastic piping components. Include marking with "NSF-drain" for plastic drain piping and "NSF-sewer" for plastic sewer piping.

1.14 PROJECT CONDITIONS

A. Interruption of Existing Storm-Drainage Service: Do not interrupt service to facilities occupied by Owner or others unless permitted under the following conditions and then only after arranging to provide temporary service according to requirements indicated:

1. Notify Architect no fewer than two days in advance of proposed interruption of storm-drainage service.
2. Do not proceed with interruption of storm-drainage service without Architect's written permission.

B. Elastic Membrane Sheet: ASTM D 4068, flexible, chlorinated polyethylene, 40-mil minimum thickness.

C. Fasteners: Metal compatible with material and substrate being fastened.

D. Metal Accessories: Sheet metal strips, clamps, anchoring devices, and similar accessory units required for installation; matching or compatible with material being installed.

E. Solder: ASTM B 32, lead-free alloy.

PART 2 - PRODUCTS

2.1 METAL ROOF DRAINS

A. Cast-Iron, Large-Sump, General-Purpose Roof Drains:

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
2. Basis-of-Design Product: Subject to compliance with requirements, provide product indicated on Drawings or comparable product by one of the following:

    a. Zurn
    b. JR Smith
    c. Watts

3. Standard: ASME A112.6.4, for general-purpose roof drains.
4. Body Material: Cast iron.
5. Dimension of Body: Nominal 15-inch diameter.
6. Combination Flashing Ring and Gravel Stop: Required.
7. Outlet: Bottom.
8. Extension Collars: Required.
9. Underdeck Clamp: Required.
10. Sump Receiver Plate: Required.
11. Dome Material: Cast iron.
12. Perforated Gravel Guard: Stainless steel.
13. Vandal-Proof Dome: Required.
14. Overflow Drain Water Dam: 2 inches.

2.2 MISCELLANEOUS STORM DRAINAGE PIPING SPECIALTIES

A. Downspout Adaptors:

1. Description: Manufactured, gray-iron casting, for attaching to horizontal-outlet, parapet roof drain and to exterior, sheet metal downspout.
2. Size: Inlet size to match parapet drain outlet.

B. Downspout Boots:

1. Description: Manufactured, ASTM A 48/A 48M, gray-iron casting, with strap or ears for attaching to building; NPS 4 (DN 100) outlet; and shop-applied bituminous coating.
2. Size: Inlet size to match downspout and NPS 4 (DN 100) outlet.

C. Conductor Nozzles:

1. Description: Bronze body with threaded inlet and bronze wall flange with mounting holes.
2. Size: Same as connected conductor.

2.3 CLEANOUTS

A. Floor Cleanouts:

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
2. Basis-of-Design Product: Subject to compliance with requirements, provide product indicated on Drawings or comparable product by one of the following:

    a. Zurn
    b. JR Smith
    c. Watts.

3. Standard: ASME A112.36.2M, for adjustable housing cleanouts.
4. Size: Same as connected branch.
5. Type: Adjustable housing.
6. Body or Ferrule Material: Cast iron.
7. Clamping Device Required.
8. Outlet Connection: Spigot.
9. Closure: Cast-iron plug.
10. Adjustable Housing Material: Cast iron with threads
11. Frame and Cover Material and Finish: Stainless steel.
12. Frame and Cover Shape: Round.
13. Top-Loading Classification: Heavy Duty.
14. Riser: ASTM A 74, Service class, cast-iron drainage pipe fitting and riser to cleanout.

B. Test Tees:

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
2. Basis-of-Design Product: Subject to compliance with requirements, provide product indicated on Drawings or comparable product by one of the following:

    a. Zurn
    b. JR Smith
    c. Watts

3. Standard: ASME A112.36.2M and ASTM A 74, ASTM A 888, or CISPI 301, for cleanout test tees.
4. Size: Same as connected drainage piping.
5. Body Material: Hub-and-spigot, cast-iron soil-pipe T-branch or hubless, cast-iron soil-pipe test tee as required to match connected piping.
6. Closure Plug: Countersunk.
7. Closure Plug Size: Same as or not more than one size smaller than cleanout size.

C. Wall Cleanouts:

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
2. Basis-of-Design Product: Subject to compliance with requirements, provide product indicated on Drawings or comparable product by one of the following:

    a. Zurn
    b. JR Smith.
    c. Watts

3. Standard: ASME A112.36.2M, for cleanouts. Include wall access.
4. Size: Same as connected drainage piping.
5. Body Material Hubless, cast-iron soil-pipe test tee as required to match connected piping.

6. Closure: Countersunk or raised-head cast-iron plug.
7. Closure Plug Size: Same as or not more than one size smaller than cleanout size.
8. Wall Access: Round, flat, chrome-plated brass or stainless-steel cover plate with screw.
9. Wall Access: Round stainless-steel wall-installation frame and cover.

2.4 TRENCH DRAINS

A. Trench Drains:

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
2. Basis-of-Design Product: Subject to compliance with requirements, provide product indicated on Drawings or comparable product by one of the following:

   a. Z
   b. JR Smith
   c. Watts

3. Standard: ASME A112.6.3, for trench drains.
4. Body Material: Cast iron.
5. Flange: Anchor with weep holes as required.
6. Clamping Device: Refer to Plumbing Fixture Schedule.
7. Outlet: Bottom.
8. Grate Material: See to Plumbing Fixture Schedule.
9. Grate Finish: See to Plumbing Fixture Schedule.
10. Dimensions of Frame and Grate: See Plumbing Fixture Schedule.
11. Top-Loading Classification: Heavy Duty.

2.5 THROUGH-PENETRATION FIRESTOP ASSEMBLIES

A. Through-Penetration Firestop Assemblies:

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
2. Basis-of-Design Product: Subject to compliance with requirements, provide product indicated on Drawings or comparable product by one of the following:

   a. ProSet Systems Inc.

3. Standard: ASTM E 814, for through-penetration firestop assemblies.
4. Certification and Listing**:** Intertek Testing Service NA for through-penetration firestop assemblies.
5. Size: Same as connected pipe.
6. Sleeve: Molded PVC plastic, of length to match slab thickness and with integral nailing flange on one end for installation in cast-in-place concrete slabs.
7. Stack Fitting: ASTM A 48/A 48M, gray-iron, hubless-pattern, wye branch with neoprene O-ring at base and gray-iron plug in thermal-release harness. Include PVC protective cap for plug.
8. Special Coating: Corrosion resistant on interior of fittings.

2.6 FLASHING MATERIALS

A. Copper Sheet: ASTM B 152/B 152M,12 oz./sq. ft.

B. Zinc-Coated Steel Sheet: ASTM A 653/A 653M, with 0.20 percent copper content and 0.04-inch minimum thickness unless otherwise indicated. Include G90 hot-dip galvanized, mill-phosphatized finish for painting if indicated.

C. Elastic Membrane Sheet: ASTM D 4068, flexible, chlorinated polyethylene, 40-mil minimum thickness.

D. Fasteners: Metal compatible with material and substrate being fastened.

E. Metal Accessories: Sheet metal strips, clamps, anchoring devices, and similar accessory units required for installation; matching or compatible with material being installed.

F. Solder: ASTM B 32, lead-free alloy.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Install roof drains at low points of roof areas according to roof membrane manufacturer's written installation instructions.

1. Install flashing collar or flange of roof drain to prevent leakage between drain and adjoining roofing. Maintain integrity of waterproof membranes where penetrated.
2. Install expansion joints, if indicated, in roof drain outlets.
3. Position roof drains for easy access and maintenance.

B. Install cleanouts in aboveground piping and building drain piping according to the following instructions unless otherwise indicated:

1. Use cleanouts the same size as drainage piping up to NPS 4. Use NPS 4 for larger drainage piping unless larger cleanout is indicated.
2. Locate cleanouts at each change in direction of piping greater than 45 degrees.
3. Locate cleanouts at base of each vertical soil and waste stack.

C. For floor cleanouts for piping below floors, install cleanout deck plates with top flush with finished floor.

D. For cleanouts located in concealed piping, install cleanout wall access covers, of types indicated, with frame and cover flush with finished wall.

E. Install test tees in vertical conductors and near floor.

F. Install wall cleanouts in vertical conductors. Install access door in wall if indicated.

3.2 CONNECTIONS

A. Comply with requirements for piping specified in Section 221413 "Facility Storm Drainage Piping." Drawings indicate general arrangement of piping, fittings, and specialties.

3.3 FLASHING INSTALLATION

A. Fabricate flashing from single piece of metal unless large pans, sumps, or other drainage shapes are required. Join flashing according to the following if required:

1. Lead Sheets: Burn joints of 6.0-lb/sq. ft. lead sheets, 0.0938-inch thickness or thicker. Solder joints of 4.0-lb/sq. ft. lead sheets, 0.0625-inch thickness or thinner.
2. Copper Sheets: Solder joints of copper sheets.

B. Install sheet flashing on pipes, sleeves, and specialties passing through or embedded in floors and roofs with waterproof membrane.

1. Pipe Flashing: Sleeve type, matching the pipe size, with a minimum length of 10 inches and with skirt or flange extending at least 8 inches around pipe.
2. Sleeve Flashing: Flat sheet, with skirt or flange extending at least 8 inches around sleeve.
3. Embedded Specialty Flashing: Flat sheet, with skirt or flange extending at least 8 inches around specialty.

C. Set flashing on floors and roofs in solid coating of bituminous cement.

D. Secure flashing into sleeve and specialty clamping ring or device.

E. Fabricate and install flashing and pans, sumps, and other drainage shapes.

3.4 PROTECTION

A. Protect drains during remainder of construction period to avoid clogging with dirt or debris and to prevent damage from traffic or construction work.

B. Place plugs in ends of uncompleted piping at end of each day or when work stops.

END OF SECTION 22 14 23

SECTION 22 15 13 - GENERAL-SERVICE COMPRESSED –AIR PIPING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. This Section includes piping and related specialties for general-service compressed-air systems operating at 200 psig or less.

B. Related Sections include the following:

1. Section 221519 "General-Service Packaged Air Compressors and Receivers" for general-service air compressors and accessories.

1.3 DEFINITIONS

A. ABS: Acrylonitrile-butadiene-styrene plastic.

B. CR: Chlorosulfonated polyethylene synthetic rubber.

C. EPDM: Ethylene-propylene-diene terpolymer rubber.

D. HDPE: High-density polyethylene plastic.

E. NBR: Acrylonitrile-butadiene rubber.

F. PE: Polyethylene plastic.

G. PVC: Polyvinyl chloride plastic.

H. High-Pressure Compressed-Air Piping: System of compressed-air piping and specialties operating at pressures between 150 and 200 psig (1035 and 1380 kPa).

I. Low-Pressure Compressed-Air Piping: System of compressed-air piping and specialties operating at pressures of 150 psig (1035 kPa) or lessWORK INCLUDED

J. Furnish all labor, materials, services, testing, transportation and equipment necessary for the completion of all plumbing work as indicated on drawings and specified herein. Work materials and equipment not indicated or specified which is necessary for the complete and proper operation of the work of this Section in accordance with the true intent and meaning of the contract documents shall be provided and incorporated at no additional cost to the Owner.

1.4 QUALITY ASSURANCE

A. Code Requirements: All work covered by this Section shall conform to the latest requirements of the following regulations:

1. C.C.R., Title 24, Part 5 (2022 CPC).
2. 2022 California Plumbing Code.
3. SMACNA Seismic Restraint Manual Guidelines for Mechanical Systems.
4. National Fire Protection Association.
5. California State Division of Industrial Safety.
6. County Health Department.
7. Any other legally constituted body-having jurisdiction thereof.

B. Nothing in the specifications or drawings shall be construed to permit deviation from the requirements of governing codes unless approval for said deviation has been obtained from the legally constituted authorities having jurisdiction and from the Owner's representative.

1.5 DRAWINGS

A. Because of the small-scale drawings, it is not possible to indicate all offsets, fittings and accessories which may be required. The Contractor shall carefully investigate the conditions surrounding installation of his work, furnishing the necessary piping, fittings, valves, traps, and other devices which may be required to complete the installation.

B. The general arrangement indicated on the drawings shall be followed as closely as possible. Coordinate with the Architectural, Structural, Mechanical and Electrical Drawings and the work of other trades prior to installation of piping fixtures and equipment to verify adequate space available for installation of the work shown. In the event a field condition arises which makes it impossible to install the work as indicated, submit, in writing, the proposed departures to the Architect for his approval. Only when Architect's approval is given, in writing, shall Contractor proceed with installation of the work.

C. Special Note: Should the Contractor make changes in the installation differing from what is indicated on the contract drawings and not necessitated due to field conditions as indicated hereinabove, the Contractor shall be required to re-install the work to comply with what has been indicated on the contract drawings. Should it be impossible to re-install the work and the installation is in accordance with all governing authorities, the architect may permit the installation to remain. However, all costs incurred to revise the contract drawings by the engineer for resubmittal to the building department indicating the as-installed condition shall become the responsibility of the Contractor.

D. In case of a difference in the specifications or between the specifications and the drawings, the Contractor shall figure the most expensive alternate and after award of contract, shall secure direction from the Architect.

1.6 PERMITS, INSPECTIONS AND LICENSES

A. All permits, inspections and licenses required by the legally constituted authorities for installation of the work according to the plans and specifications shall be obtained and paid as a part of the work of this section.

1.7 EXAMINATION OF PREMISES

A. Before bidding on this work, Contractors shall make a careful examination of the premises and shall thoroughly familiarize themselves with the requirements of the contract. By the act of submitting a proposal for the work included in this contract, the Contractor shall be deemed to have made such study and examination, and that he is familiar with and accepts all conditions of the site.

1.8 PROTECTION

A. All work, equipment and materials shall be protected at all times. Contractor shall make good all damage caused either directly or indirectly by his own workmen. Contractor shall also protect his own work from damage. He shall close all pipe openings with caps or plugs during installation. He shall protect all his equipment and materials against dirt, water, chemical and mechanical injury. Upon completion, all work shall be thoroughly cleaned and delivered in a new condition.

B. Contractor shall be held responsible for all damage to equipment and materials until he has received written notice from the Architect or Engineer that his work has been accepted.

1.9 LOCATIONS

A. The locations of apparatus, piping and equipment indicated on the drawings are approximate. Piping and equipment shall be installed in such a manner as to avoid all obstruction, preserve headroom, and keep openings and passages clear. The locations of and mounting heights of all fixtures shall be coordinated with the architectural plans and room elevations.

B. Clearances and Openings: Contractor shall cooperate and coordinate his work with all other trades to avoid conflict and permit for a neat and orderly appearance of the entire installation. The Contractor shall, in advance of the work, furnish instructions to the General Contractor as to his requirements for equipment and material installation of any kind, whether or not specifically mentioned on drawings or in the specifications, and shall include recesses, chases in walls, and all required openings in the structure. Should furnishing this information be neglected, delayed or incorrect and additional cuttings are found to be required, the cost of the same shall be charged to this Contractor.

C. Contractor shall verify and coordinate pipe routing with location of all electrical rooms, elevator equipment rooms, telecom/data rooms, and other rooms dedicated to the housing of switchgear, panels, or other electrical equipment. In no case shall piping be installed within or above the ceiling of such rooms.

1.10 PERFORMANCE REQUIREMENTS

A. Seismic Performance: Compressed-air piping and support and installation shall withstand effects of seismic events determined according to SEI/ASCE 7, "Minimum Design Loads for Buildings and Other Structures."

1.11 SUBMITTAL DATA

A. Submittal Requirements:

1. Furnish, all at one time, prior to any installation, within the time noted below, six (6) copies of valid submittal data on all fixtures, material, equipment and devices. Each submitted item shall be indexed and referenced to these specifications and to identification numbers on fixtures and equipment schedules.
2. Manufacturers' submittal literature and shop drawings are required on all items to ensure the latest and most complete manufacturer's data is available for review. Requirements of the submittals and Engineer's submittal notes are a part of the work of this Division except that Engineer's notes may not be used as a means of increasing the scope of work of this Division.
3. Submittals will be checked for general conformance with the design concept of the project but the review does not guarantee quantities shown and does not supersede requirements of this Division to properly install work.
4. To be valid, all submittals must:

    a. Be delivered to the Architect's office within thirty-five (35) days of award of the contract. Contractor shall make time allowance for Engineer's review, return of comments, if any, and resubmittal if required. Corrections or changes in submittals returned as inadequate or incomplete shall be accomplished within this time limit.
    b. Clearly indicate and label as such any items proposed as substitution for that specified or shown on plans.
    c. Include all pertinent construction, installation, performance and technical data.
    d. Have all product data sheets clearly labeled to indicate the individual items being submitted. In addition, all required options and accessories shall be clearly marked.

        1) Product data sheets corresponding to items indicated on plans shall be clearly labeled with the corresponding fixture or equipment tag number.
        2) Product data sheets corresponding to items indicated in specifications shall be clearly labeled with the specification section, page and item numbers.

    e. Include, for every item which differs in size, configuration, connections, service, accessibility or any other significant way, a drawing to the same (or larger) scale as to the pertinent portions of the contract drawings. In this drawing show a complete layout of the system except that which is identical to the contract drawings, unless the unchanged portions must be shown to indicate such things as clearances. This drawing, together with the contract design drawings must show the complete system as revised to accommodate the proposed alternate.

B. Substitution Requirements:

1. Any items included in submittals and proposed by the Contractor as substitution for that specified or shown on plans shall be submitted within thirty five (35) days of award of the contract. After such time, proposed substitutions shall not be accepted for review, and the Contractor shall submit all items as specified or shown on plans.

    a. For each item proposed as substitution for that specified or shown on plans, copies of product data sheets for the specified item shall be placed side by side with product data sheets for the proposed substitution item within the submittal.

        1) In addition to the Submittal Requirements for labeling listed above, product data sheets for the specified item shall be clearly labeled "SPECIFIED ITEM, NOT SUBMITTED". Product data sheets for the corresponding proposed substitution item shall be clearly labeled "PROPOSED SUBSTITUTION".

b. Provide calculations and other detailed data justifying how any items proposed as substitution were selected for proposal. Data must be complete enough to permit detailed comparison of every significant characteristic for which the specified item was analyzed during design.

2. It shall be the Contractor's responsibility to provide sufficient information to allow the Engineer to analyze any proposed alternate. If inadequate information is provided, the proposal will not be approved and resubmittal will not be allowed.
3. The Contractor shall provide or perform tests required by Engineer for purpose of judging acceptability of proposed substitutions.
4. The Contractor assumes full responsibility that alternate items and procedures will meet the job requirements and is responsible for cost of redesign and of modifications to this and other parts of work caused by alternate items furnished under work in this Section. In view of these responsibilities, it is the purpose of these specifications to establish procedures to ensure that the Contractor has considered all the ramifications of proposed alternates before submitting them for review. Submittals which do not comply with the requirements of these specifications or which indicate proposed alternates that were selected without proper regard to the requirements of the job will not be approved. No more than one proposed alternate will be considered for each item.
5. Alternate items installed without Engineer's approval will be replaced with specified items at Contractor's expense.

1.12 FIELD CONDITIONS

A. Interruption of Existing Water Service: Do not interrupt water service to facilities occupied by Owner or others unless permitted under the following conditions and then only after arranging to provide temporary water service according to requirements indicated:

1. Notify Architect no fewer than two days in advance of proposed interruption of water service.
2. Do not interrupt water service without Architect's written permission.

PART 2 - PRODUCTS

2.1 PIPING MATERIALS

A. Piping within the building and above grade shall be Type "L" ASTM B88, hard drawn copper tubing with wrought copper sweat fittings ANSI B16.18 and B16.22,

B. Outdoor underground piping in sizes 2-1/2" and 3" shall be Type "L" ASTM B88, hard drawn copper as specified for water piping within the building. Piping 2" and smaller shall be Type "K" ASTM B88, hard drawn copper with wrought copper sweat fittings ANSI B16.18 and B16.22

C. Piping below the building floor shall be Type "K" soft annealed copper tubing with no fittings below the slab.

2.2 COPPER TUBE AND FITTINGS

A. Hard Copper Tube: ASTM B 88, Type L water tube, drawn temper.

B. Soft Copper Tube: ASTM B 88, Type K water tube, annealed temper.

C. Wrought-Copper, Solder-Joint Fittings: ASME B16.22, wrought-copper pressure fittings.

D. Bronze Flanges: ASME B16.24, Class 150, with solder-joint ends.

E. Copper Unions:

1. MSS SP-123.
2. Cast-copper-alloy, hexagonal-stock body.
3. Ball-and-socket, metal-to-metal seating surfaces.
4. Solder-joint or threaded ends.

2.3 PIPING JOINING MATERIALS

A. Pipe-Flange Gasket Materials:

1. AWWA C110/A21.10, rubber, flat face, 1/8 inch thick or ASME B16.21, nonmetallic and asbestos free unless otherwise indicated.
2. Full-face or ring type unless otherwise indicated.

B. Metal, Pipe-Flange Bolts and Nuts: ASME B18.2.1, carbon steel unless otherwise indicated.

C. Solder Filler Metals: ASTM B 32, lead-free alloys.

D. Flux: ASTM B 813, water flushable.

E. Brazing Filler Metals: AWS A5.8/A5.8M, BCuP Series, copper-phosphorus alloys for general-duty brazing unless otherwise indicated.

2.4 ENCASEMENT FOR PIPING

A. Standard: ASTM A 674 or AWWA C105/A21.5.

B. Form: Sheet or tube.

C. Color: natural.

2.5 QUICK COUPLINGS

A. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:

B. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1. Amflo

C. General Requirements for Quick Couplings: Assembly with locking-mechanism feature for quick connection and disconnection of compressed-air hose.

D. Automatic-Shutoff Quick Couplings: Straight-through brass body with O-ring or gasket seal and stainless-steel or nickel-plated-steel operating parts.

E. Valveless Quick Couplings: Straight-through brass body with stainless-steel or nickel-plated-steel operating parts.

1. Socket End: With O-ring or gasket seal, without valve, and with barbed inlet for attaching hose.
2. Plug End: With barbed outlet for attaching hose.

2.6 HOSE ASSEMBLIES

A. Furnish and install the overhead air and water hose reels as indicated on the drawings and as herein specified. Overhead reel assemblies shall be as manufactured by Grover Standard Enclosed Ceiling Reels, as listed below, or approved equal. The units shall be completely enclosed type with end panels, service hoses, control and accessories as specified.
1. Each reel assembly shall include the following items:
2. 1106 #513 water reel with 4240 1/4" x 20' service hose, 980P control and 502 bibb.
3. 1107 #513 air reel with 4300 1/4" x 25' service hose, 918 control, air coupler and 908 truck type tire inflator with 60D adaptor.

PART 3 - EXECUTION

3.1 PIPING INSTALLATION

A. Drawing plans, schematics, and diagrams indicate general location and arrangement of compressed-air piping. Indicated locations and arrangements were used to size pipe and calculate friction loss, expansion, air-compressor sizing, and other design considerations. Install piping as indicated unless deviations to layout are approved on Coordination Drawings.

B. Install piping concealed from view and protected from physical contact by building occupants, unless otherwise indicated and except in equipment rooms and service areas.

C. Install piping indicated to be exposed and piping in equipment rooms and service areas at right angles or parallel to building walls. Diagonal runs are prohibited, unless otherwise indicated.

D. Install piping above accessible ceilings to allow sufficient space for ceiling panel removal and to coordinate with other services occupying that space.

E. Install piping adjacent to equipment and machines to allow service and maintenance.

F. Install air and drain piping with 1 percent slope downward in direction of flow.

G. Install nipples, flanges, unions, transition and special fittings, and valves with pressure ratings same as or higher than system pressure rating, unless otherwise indicated.

H. Equipment and Specialty Flanged Connections:

1. Use steel companion flange with gasket for connection to steel pipe.
2. Use cast-copper-alloy companion flange with gasket and brazed or soldered joint for connection to copper tube. Do not use soldered joints for connection to air compressors or to equipment or machines producing shock or vibration.

I. Flanged joints may be used instead of specified joint for any piping or tubing system.

J. Extended-tee outlets with brazed branch connection may be used for copper tubing, within extruded-tee connection diameter to run tube diameter ratio for tube type, according to Extruded Tee Connections Sizes and Wall Thickness for Copper Tube (Inches) Table in ASTM F 2014.

K. Install eccentric reducers where compressed-air piping is reduced in direction of flow, with bottoms of both pipes and reducer fitting flush.

L. Install branch connections to compressed-air mains from top of main. Provide drain leg and drain trap at end of each main and branch and at low points.

M. Install thermometer and pressure gage on discharge piping from each air compressor and on each receiver. Comply with requirements in Section 220519 "Meters and Gages for Plumbing Piping."

N. Install piping to permit valve servicing.

O. Install piping free of sags and bends.

P. Install fittings for changes in direction and branch connections.

Q. Install seismic restraints on piping. Seismic-restraint devices are specified in Section 220548 "Vibration and Seismic Controls for Plumbing Piping and Equipment."

R. Install sleeves for piping penetrations of walls, ceilings, and floors. Comply with requirements for sleeves specified in Section 220517 "Sleeves and Sleeve Seals for Plumbing Piping."

S. Install sleeve seals for piping penetrations of concrete walls and slabs. Comply with requirements for sleeve seals specified in Section 220517 "Sleeves and Sleeve Seals for Plumbing Piping."

T. Install escutcheons for piping penetrations of walls, ceilings, and floors. Comply with requirements for escutcheons specified in Section 220518 "Escutcheons for Plumbing Piping."

3.2 JOINT CONSTRUCTION

A. Ream ends of pipes and tubes and remove burrs. Bevel plain ends of steel pipe.

B. Remove scale, slag, dirt, and debris from inside and outside of pipe and fittings before assembly.

C. Threaded Joints: Thread pipe with tapered pipe threads according to ASME B1.20.1. Cut threads full and clean using sharp dies. Ream threaded pipe ends to remove burrs and restore full ID. Join pipe fittings and valves as follows:

1. Apply appropriate tape or thread compound to external pipe threads unless dry seal threading is specified.
2. Damaged Threads: Do not use pipe or pipe fittings with threads that are corroded or damaged. Do not use pipe sections that have cracked or open welds.

D. Welded Joints for Steel Piping: Join according to AWS D10.12/D10.12M.

E. Brazed Joints for Copper Tubing: Join according to AWS's "Brazing Handbook," "Pipe and Tube" Chapter.

F. Soldered Joints: Apply ASTM B 813, water-flushable flux, unless otherwise indicated, to tube end. Join according to ASTM B 828 or CDA's "Copper Tube Handbook."

G. Extruded-Tee Outlets for Copper Tubing: Form branches according to ASTM F 2014, with tools recommended by procedure manufacturer, and using operators qualified according to Part 1 "Quality Assurance" Article.

H. Flanged Joints: Use asbestos-free, nonmetallic gasket suitable for compressed air. Join flanges with gasket and bolts according to ASME B31.9 for bolting procedure.

I. Grooved Joints: Assemble couplings with housing, gasket, lubricant, and bolts. Join according to AWWA C606 for grooved joints. Do not apply lubricant to prelubricated gaskets.

J. Heat-Fusion Joints for PE Piping: Clean and dry joining surfaces by wiping with clean cloth or paper towels. Join according to ASTM D 2657 for socket-fusion joints.

K. Pressure-Sealed Joints: Join with tools recommended by fitting manufacturer, using operators qualified according to Part 1 "Quality Assurance" Article.

L. Solvent-Cemented Joints for ABS Piping: Clean and dry joining surfaces. Join according to the following:

1. Comply with ASTM F 402 for safe-handling practice of cleaners, primers, and solvent cements.
2. Join according to ASME B31.9 for solvent-cemented joints and to ASTM D 2235 Appendix.

M. Solvent-Cemented Joints for PVC Piping: Clean and dry joining surfaces. Join according to the following:

1. Comply with ASTM F 402 for safe-handling practice of cleaners, primers, and solvent cements.
2. Apply primer and join according to ASME B31.9 for solvent-cemented joints and to ASTM D 2672.

N. Dissimilar Metal Piping Material Joints: Use dielectric fittings.

3.3 VALVE INSTALLATION

A. General-Duty Valves: Comply with requirements in Section 220523 "General-Duty Valves for Plumbing Piping."

B. Install shutoff valves and unions or flanged joints at compressed-air piping to air compressors.

C. Install shutoff valve at inlet to each automatic drain valve, filter, lubricator, and pressure regulator.

D. Install check valves to maintain correct direction of compressed-air flow to and from compressed-air piping specialties and equipment.

3.4 CONNECTIONS

A. Install unions, in piping NPS 2 and smaller, adjacent to each valve and at final connection to each piece of equipment and machine.

B. Install flanges, in piping NPS 2-1/2 and larger, adjacent to flanged valves and at final connection to each piece of equipment and machine.

3.5 HANGER AND SUPPORT INSTALLATION

A. Comply with requirements for seismic-restraint devices in Section 220548 "Vibration and Seismic Controls for Plumbing Piping and Equipment."

B. Comply with requirements for pipe hanger, support products, and installation in Section 220529 "Hangers and Supports for Plumbing Piping and Equipment."

1. Vertical Piping: MSS Type 8 or 42, clamps.
2. Individual, Straight, Horizontal Piping Runs:

   a. 100 Feet and Less: MSS Type 1, adjustable, steel clevis hangers.
   b. Longer Than 100 Feet: MSS Type 43, adjustable roller hangers.
   c. Longer Than 100 Feet if Indicated: MSS Type 49, spring cushion rolls.

3. Multiple, Straight, Horizontal Piping Runs 100 Feet or Longer: MSS Type 44, pipe rolls. Support pipe rolls on trapeze.
4. Base of Vertical Piping: MSS Type 52, spring hangers.

C. Support vertical piping and tubing at base and at each floor.

D. Rod diameter may be reduced one size for double-rod hangers, to a minimum of 3/8 inch.

E. Install hangers for copper tubing with the following maximum horizontal spacing and minimum rod diameters:

1. NPS 2 and Smaller: 72 inches with 3/8-inch rod.
2. NPS 2-1/2 to NPS 3: 8 feet with 1/2-inch rod.

F. Install supports for vertical copper tubing every 10 feet.

G. Support piping and tubing not listed in this article according to MSS SP-69 and manufacturer's written instructions.

3.6 CONNECTIONS

A. Drawings indicate general arrangement of piping, fittings, and specialties.

B. When installing piping adjacent to equipment and machines, allow space for service and maintenance.

C. Connect domestic water piping to exterior water-service piping. Use transition fitting to join dissimilar piping materials.

D. Connect domestic water piping to water-service piping with shutoff valve; extend and connect to the following:

1. Water Heaters: Cold-water inlet and hot-water outlet piping in sizes indicated, but not smaller than sizes of water heater connections.
2. Plumbing Fixtures: Cold- and hot-water-supply piping in sizes indicated, but not smaller than that required by plumbing code.
3. Equipment: Cold- and hot-water-supply piping as indicated, but not smaller than equipment connections. Provide shutoff valve and union for each connection. Use flanges instead of unions for NPS 2-1/2 and larger.

3.7 LABELING AND IDENTIFICATION

A. Install identifying labels and devices for general-service compressed-air piping, valves, and specialties. Comply with requirements in Section 220553 "Identification for Plumbing Piping and Equipment."

3.8 FIELD QUALITY CONTROL

A. Perform field tests and inspections.

B. Tests and Inspections:

1. Piping Leak Tests for Metal Compressed-Air Piping: Test new and modified parts of existing piping. Cap and fill general-service compressed-air piping with oil-free dry air or gaseous nitrogen to pressure of 50 psig above system operating pressure, but not less than 150 psig. Isolate test source and let stand for four hours to equalize temperature. Refill system, if required, to test pressure; hold for two hours with no drop in pressure.
2. Piping Leak Tests for ABS Compressed-Air Piping: Test new and modified parts of existing piping. Cap and fill general-service compressed-air piping with oil-free dry air or gaseous nitrogen, at temperature of 110° F or less, to pressure of 40 psig above system operating pressure, but not less than **80 psig, 100 psig** or more than 120 psig . Isolate test source and let stand for four hours to equalize temperature. Refill system, if required, to test pressure; hold for two hours with no drop in pressure.
3. Piping Leak Tests for HDPE Compressed-Air Piping: Test new and modified parts of existing piping. Cap and fill general-service compressed-air piping with oil-free dry air or gaseous nitrogen, at temperature of 100° F or less, to pressure of 40 psig above system operating pressure, but not less than **100 psig, 125 psig, 150 psig** or more than 180 psig. Isolate test source and let stand for four hours to equalize temperature. Refill system, if required, to test pressure; hold for two hours with no drop in pressure.
4. Repair leaks and retest until no leaks exist.
5. Inspect filters, lubricators, and pressure regulators for proper operation.

C. Prepare test reports.

END OF SECTION 22 15 13

SECTION 22 15 13 - GENERAL-SERVICE AIR COMPRESSORS AND RECIEVERS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section Includes:

1. Lubricated, reciprocating air compressors.
2. Oil-free, reciprocating air compressors.
3. Oilless, reciprocating air compressors.
4. Oil-free, rotary-screw air compressors.
5. Oil-flooded, rotary-screw air compressors.
6. Oil-free, rotary, sliding-vane air compressors.
7. Oil-sealed, rotary, sliding-vane air compressors.
8. Inlet-air filters.
9. Air-cooled, compressed-air aftercoolers.
10. Water-cooled, compressed-air aftercoolers.
11. Refrigerant compressed-air dryers.
12. Desiccant compressed-air dryers.
13. Computer interface cabinet.

1.3 DEFINITIONS

A. Actual Air: Air delivered from air compressors. Flow rate is delivered compressed air measured in acfm.

B. Standard Air: Free air at 68 deg F and 1 atmosphere before compression or expansion and measured in scfm.

1.4 QUALITY ASSURANCE

A. Code Requirements: All work covered by this Section shall conform to the latest requirements of the following regulations:

1. C.C.R., Title 24, Part 5 (2022 CPC).
2. 2022 California Plumbing Code.
3. SMACNA Seismic Restraint Manual Guidelines for Mechanical Systems.
4. National Fire Protection Association.
5. California State Division of Industrial Safety.
6. County Health Department.
7. Any other legally constituted body-having jurisdiction thereof.

B. Nothing in the specifications or drawings shall be construed to permit deviation from the requirements of governing codes unless approval for said deviation has been obtained from the legally constituted authorities having jurisdiction and from the Owner's representative.

1.5 DRAWINGS

A. Because of the small-scale drawings, it is not possible to indicate all offsets, fittings and accessories which may be required. The Contractor shall carefully investigate the conditions surrounding installation of his work, furnishing the necessary piping, fittings, valves, traps, and other devices which may be required to complete the installation.

B. The general arrangement indicated on the drawings shall be followed as closely as possible. Coordinate with the Architectural, Structural, Mechanical and Electrical Drawings and the work of other trades prior to installation of piping fixtures and equipment to verify adequate space available for installation of the work shown. In the event a field condition arises which makes it impossible to install the work as indicated, submit, in writing, the proposed departures to the Architect for his approval. Only when Architect's approval is given, in writing, shall Contractor proceed with installation of the work.

C. Special Note: Should the Contractor make changes in the installation differing from what is indicated on the contract drawings and not necessitated due to field conditions as indicated hereinabove, the Contractor shall be required to re-install the work to comply with what has been indicated on the contract drawings. Should it be impossible to re-install the work and the installation is in accordance with all governing authorities, the architect may permit the installation to remain. However, all costs incurred to revise the contract drawings by the engineer for resubmittal to the building department indicating the as-installed condition shall become the responsibility of the Contractor.

D. In case of a difference in the specifications or between the specifications and the drawings, the Contractor shall figure the most expensive alternate and after award of contract, shall secure direction from the Architect.

1.6 PERMITS, INSPECTIONS AND LICENSES

A. All permits, inspections and licenses required by the legally constituted authorities for installation of the work according to the plans and specifications shall be obtained and paid as a part of the work of this section.

1.7 EXAMINATION OF PREMISES

A. Before bidding on this work, Contractors shall make a careful examination of the premises and shall thoroughly familiarize themselves with the requirements of the contract. By the act of submitting a proposal for the work included in this contract, the Contractor shall be deemed to have made such study and examination, and that he is familiar with and accepts all conditions of the site.

1.8 PROTECTION

A. All work, equipment and materials shall be protected at all times. Contractor shall make good all damage caused either directly or indirectly by his own workmen. Contractor shall also protect his own work from damage. He shall close all pipe openings with caps or plugs during

installation. He shall protect all his equipment and materials against dirt, water, chemical and mechanical injury. Upon completion, all work shall be thoroughly cleaned and delivered in a new condition.

B. Contractor shall be held responsible for all damage to equipment and materials until he has received written notice from the Architect or Engineer that his work has been accepted.

1.9 LOCATIONS

A. The locations of apparatus, piping and equipment indicated on the drawings are approximate. Piping and equipment shall be installed in such a manner as to avoid all obstruction, preserve headroom, and keep openings and passages clear. The locations of and mounting heights of all fixtures shall be coordinated with the architectural plans and room elevations.

B. Clearances and Openings: Contractor shall cooperate and coordinate his work with all other trades to avoid conflict and permit for a neat and orderly appearance of the entire installation. The Contractor shall, in advance of the work, furnish instructions to the General Contractor as to his requirements for equipment and material installation of any kind, whether or not specifically mentioned on drawings or in the specifications, and shall include recesses, chases in walls, and all required openings in the structure. Should furnishing this information be neglected, delayed or incorrect and additional cuttings are found to be required, the cost of the same shall be charged to this Contractor.

C. Contractor shall verify and coordinate pipe routing with location of all electrical rooms, elevator equipment rooms, telecom/data rooms, and other rooms dedicated to the housing of switchgear, panels, or other electrical equipment. In no case shall piping be installed within or above the ceiling of such rooms.

1.10 SUBMITTAL DATA

A. Submittal Requirements:

1. Furnish, all at one time, prior to any installation, within the time noted below, six (6) copies of valid submittal data on all fixtures, material, equipment and devices. Each submitted item shall be indexed and referenced to these specifications and to identification numbers on fixtures and equipment schedules.
2. Manufacturers’ submittal literature and shop drawings are required on all items to ensure the latest and most complete manufacturer's data is available for review. Requirements of the submittals and Engineer's submittal notes are a part of the work of this Division except that Engineer's notes may not be used as a means of increasing the scope of work of this Division.
3. Submittals will be checked for general conformance with the design concept of the project but the review does not guarantee quantities shown and does not supersede requirements of this Division to properly install work.
4. To be valid, all submittals must:

    a. Be delivered to the Architect's office within thirty-five (35) days of award of the contract. Contractor shall make time allowance for Engineer’s review, return of comments, if any, and resubmittal if required. Corrections or changes in submittals returned as inadequate or incomplete shall be accomplished within this time limit.
    b. Clearly indicate and label as such any items proposed as substitution for that specified or shown on plans.
    c. Include all pertinent construction, installation, performance and technical data.

d. Have all product data sheets clearly labeled to indicate the individual items being submitted. In addition, all required options and accessories shall be clearly marked.

1) Product data sheets corresponding to items indicated on plans shall be clearly labeled with the corresponding fixture or equipment tag number.
2) Product data sheets corresponding to items indicated in specifications shall be clearly labeled with the specification section, page and item numbers.

e. Include, for every item which differs in size, configuration, connections, service, accessibility or any other significant way, a drawing to the same (or larger) scale as to the pertinent portions of the contract drawings. In this drawing show a complete layout of the system except that which is identical to the contract drawings, unless the unchanged portions must be shown to indicate such things as clearances. This drawing, together with the contract design drawings must show the complete system as revised to accommodate the proposed alternate.

B. Substitution Requirements:

1. Any items included in submittals and proposed by the Contractor as substitution for that specified or shown on plans shall be submitted within thirty five (35) days of award of the contract. After such time, proposed substitutions shall not be accepted for review, and the Contractor shall submit all items as specified or shown on plans.

a. For each item proposed as substitution for that specified or shown on plans, copies of product data sheets for the specified item shall be placed side by side with product data sheets for the proposed substitution item within the submittal.

1) In addition to the Submittal Requirements for labeling listed above, product data sheets for the specified item shall be clearly labeled “SPECIFIED ITEM, NOT SUBMITTED”. Product data sheets for the corresponding proposed substitution item shall be clearly labeled “PROPOSED SUBSTITUTION”.

b. Provide calculations and other detailed data justifying how any items proposed as substitution were selected for proposal. Data must be complete enough to permit detailed comparison of every significant characteristic for which the specified item was analyzed during design.

2. It shall be the Contractor’s responsibility to provide sufficient information to allow the Engineer to analyze any proposed alternate. If inadequate information is provided, the proposal will not be approved and resubmittal will not be allowed.
3. The Contractor shall provide or perform tests required by Engineer for purpose of judging acceptability of proposed substitutions.
4. The Contractor assumes full responsibility that alternate items and procedures will meet the job requirements and is responsible for cost of redesign and of modifications to this and other parts of work caused by alternate items furnished under work in this Section. In view of these responsibilities, it is the purpose of these specifications to establish procedures to ensure that the Contractor has considered all the ramifications of proposed alternates before submitting them for review. Submittals which do not comply with the requirements of these specifications or which indicate proposed alternates that were selected without proper regard to the requirements of the job will not be approved. No more than one proposed alternate will be considered for each item.
5. Alternate items installed without Engineer's approval will be replaced with specified items at Contractor's expense.

6. The Architect or his authorized representative shall be the sole judge as to the quality and suitability of proposed alternate equipment, fixtures or materials. Decisions of the Architect or that of his representative shall be final and conclusive.

1.11 MAINTENANCE MATERIAL SUBMITTALS

A. Furnish extra materials that are packaged with protective covering for storage and identified with labels describing contents.

1. Air-Compressor, Inlet-Air-Filter Elements: Equal to 100% percent of amount installed, but no fewer than 1 units.
2. Belts: One for each belt-driven compressor.

1.12 UNINSPECTED WORK

A. The Contractor shall not allow or cause any of his work to be covered up or closed in until it has been inspected, tested, approved by all authorities have jurisdiction, and until Project Record drawings have been properly annotated.

B. Should any of his work be covered up or closed in before such inspection, he shall, at his own expense, uncover the work to the satisfaction of the inspection party. All related repair work cost shall be borne by the Contractor.

1.13 RECORD DRAWINGS

A. Contractor shall provide and keep up-to-date a complete "as-built" record set of blueline prints which shall show every change from the original drawings and the exact "as-built" locations and sizes of the work provided under this Section of the specifications. This set shall include locations, dimensions, depth of buried piping, cleanouts, shut-off valves, sewer invert locations, plugged wyes, tees, etc. On completion of the work, the Contractor shall incorporate all as-built information on a set of reproducible tracings provided by the Architect and this set of reproducibles shall be delivered to the Architect.

1.14 GUARANTEES

A. Contractor shall guarantee the entire plumbing and piping systems unconditionally for a period of one (1) year after final acceptance. If, during this period, any materials, equipment, or any part of the systems fail to function properly, the Contractor shall make good the defects promptly and without any expense to the Owner.

B. Contractor shall be responsible for all damage to any part of the premises caused by leaks in pipelines or equipment furnished and installed under this Section for a period of one (1) year after date of acceptance of his work.

C. All equipment and fixtures shall carry manufacturer's warranty against defective parts or poor workmanship for not less than one (1) year. See specific equipment specifications for extended warranty requirements.

1.15 FIELD CONDITIONS

A. Interruption of Existing Compressed-Air Service: Do not interrupt service to facilities occupied by Owner or others unless permitted under the following conditions and then only after arranging to provide temporary service according to requirements indicated:

1. Notify Architect no fewer than two days in advance of proposed interruption of compressed-air service.
2. Do not proceed with interruption of compressed-air service without Architect's, written permission.

1.16 COORDINATION

A. Coordinate sizes and locations of concrete bases with actual equipment provided.

PART 2 - PRODUCTS

2.1 SYSTEM DESCRIPTION

A. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.

B. ASME Compliance: Fabricate and label receivers to comply with ASME Boiler and Pressure Vessel Code.

2.2 PERFORMANCE REQUIREMENTS

A. Delegated Design: Engage a qualified professional engineer, as defined in Section 014000 "Quality Requirements," to design compressed-air equipment mounting.

B. Seismic Performance: Compressed-air equipment shall withstand the effects of earthquake motions determined according to ASCE/SEI 7.

1. The term "withstand" means "the unit will remain in place without separation of any parts from the device when subjected to the seismic forces specified and the unit will be fully operational after the seismic event."

2.3 GENERAL REQUIREMENTS FOR PACKAGED AIR COMPRESSORS AND RECEIVERS

A. General Description: Factory-assembled, -wired, -piped, and -tested; electric-motor-driven; air-cooled; continuous-duty air compressors and receivers that deliver air of quality equal to intake air.

B. Control Panels: Automatic control station with load control and protection functions. Comply with NEMA ICS 2 and UL 508.

1. Enclosure: NEMA ICS 6, Type 12 control panel unless otherwise indicated.
2. Motor Controllers: Full-voltage, combination magnetic type with undervoltage release feature and motor-circuit-protector-type disconnecting means and short-circuit protective device.

3. Control Voltage: 120-V ac or less, using integral control power transformer.
4. Motor Overload Protection: Overload relay in each phase.
5. Starting Devices: Hand-off-automatic selector switch in cover of control panel, plus pilot device for automatic control.
6. Automatic control switches to alternate lead-lag compressors for duplex air compressors.
7. Instrumentation: Include discharge-air pressure gage, air-filter maintenance indicator, hour meter, compressor discharge-air and coolant temperature gages, and control transformer.
8. Alarm Signal Device: For connection to alarm system to indicate when backup air compressor is operating.

C. Receivers: Steel tank constructed according to ASME Boiler and Pressure Vessel Code: Section VIII, Division 1.

1. Pressure Rating: At least as high as highest discharge pressure of connected compressors, and bearing appropriate code symbols.
2. Interior Finish: Corrosion-resistant coating.
3. Accessories: Include safety valve, pressure gage, drain, and pressure-reducing valve.

D. Mounting Frame: Fabricate mounting and attachment to pressure vessel with reinforcement strong enough to resist packaged equipment movement during a seismic event when base is anchored to building structure.

2.4 LUBRICATED, RECIPROCATING AIR COMPRESSORS

A. Manufacturers: Subject to compliance with requirements, provide products by the following:

B. Basis-of-Design Product: Subject to compliance with requirements, provide product indicated on Drawings or comparable product by one of the following:

1. Ingersoll-Rand; Air Solutions Group.

C. Compressor(s): Lubricated, reciprocating-piston type with lubricated compression chamber and crankcase.

1. Submerged gear-type oil pump.
2. Oil filter.
3. Combined high discharge-air temperature and low lubrication-oil pressure switch.
4. Belt guard totally enclosing pulleys and belts.

D. Capacities and Characteristics:

1. Air Compressor(s): One; two stage.

a. Intercooler between stages of two-stage units.

2. Standard-Air Capacity of Each Air Compressor: 16 scfm free air.
3. Actual-Air Capacity of Each Air Compressor: 24 acfm delivered.
4. Discharge-Air Pressure: 175 psi max.
5. Intake-Air Temperature: 32°-100° F.
6. Mounting: Tank mounted.
7. Motor (Each Air Compressor):

a. Horsepower: 7.5.

b. Speed: 1600 rpm.

8. Electrical Characteristics:

a. Volts: 460.
b. Phase: Three.
c. Hertz: 60.

9. Receiver: ASME construction steel tank.

a. Arrangement: Vertical.
b. Capacity: 80.
c. Drain: Manual valve.

2.5 INLET-AIR FILTERS

A. Description: Combination inlet-air filter-silencer, suitable for remote installation, for each air compressor.

1. Construction: Weatherproof housing for replaceable, dry-type filter element, with silencer tubes or other method of sound reduction.
2. Capacity: Match capacity of air compressor, with filter having collection efficiency of 99 percent retention of particles larger than 10 micrometers.

B. Description: Combination inlet-air filter-silencer, suitable for remote installation, for multiple air compressors.

1. Construction: Weatherproof housing for replaceable, dry-type filter element, with silencer tubes or other method of sound reduction.
2. Capacity: Match total capacity of connected air compressors, with filter having collection efficiency of 99 percent retention of particles larger than 10 micrometers.

PART 3 - EXECUTION

3.1 EQUIPMENT INSTALLATION

A. Equipment Mounting:

1. Install air compressors on cast-in-place concrete equipment base(s). Comply with requirements for equipment bases and foundations specified in.
2. Install on cast-in-place concrete equipment base(s). Comply with requirements for equipment bases and foundations specified in.
3. Comply with requirements for vibration isolation and seismic control devices specified in Section 220548 "Vibration and Seismic Controls for Plumbing Piping and Equipment"
4. Comply with requirements for vibration isolation devices specified in Section 220548.13 "Vibration Controls for Plumbing Piping and Equipment."

B. Install compressed-air equipment anchored to substrate.

C. Arrange equipment so controls and devices are accessible for servicing.

D. Maintain manufacturer's recommended clearances for service and maintenance.

E. Install the following devices on compressed-air equipment:

1. Thermometer, Pressure Gage, and Safety Valve: Install on each compressed-air receiver.
2. Pressure Regulators: Install downstream from air compressors.
3. Automatic Drain Valves: Install on aftercoolers, receivers, and dryers. Discharge condensate over nearest floor drain.

3.2 CONNECTIONS

A. Comply with requirements for piping specified in Section 221513 "General-Service Compressed-Air Piping." Drawings indicate general arrangement of piping, fittings, and specialties.

B. Where installing piping adjacent to machine, allow space for service and maintenance.

3.3 IDENTIFICATION

A. Identify general-service air compressors and components. Comply with requirements for identification specified in Section 220553 "Identification for Plumbing Piping and Equipment."

3.4 STARTUP SERVICE

A. Engage a factory-authorized service representative to perform startup service.

1. Complete installation and startup checks according to manufacturer's written instructions.
2. Check for lubricating oil in lubricated-type equipment.
3. Check belt drives for proper tension.
4. Verify that air-compressor inlet filters and piping are clear.
5. Check for equipment vibration-control supports and flexible pipe connectors, and verify that equipment is properly attached to substrate.
6. Check safety valves for correct settings. Ensure that settings are higher than air-compressor discharge pressure, but not higher than rating of system components.
7. Check for proper seismic restraints.
8. Drain receiver tanks.
9. Operational Test: After electrical circuitry has been energized, start units to confirm proper motor rotation and unit operation.
10. Test and adjust controls and safeties.

3.5 DEMONSTRATION

A. Engage a factory-authorized service representative to train Owner's maintenance personnel to adjust, operate, and maintain air compressors.

END OF SECTION 22 15 19

SECTION 22 16 16 - CONDENSATE DRAIN PIPING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section Includes:

1. Pipe, tube, and fittings.
2. Specialty pipe fittings.

B. Related Sections:S

1. Section 221619 “Condensate Drain Piping Specialties" for sanitary sewerage piping and structures outside the building.

1.3 WORK INCLUDED

A. Furnish all labor, materials, services, testing, transportation and equipment necessary for the completion of all plumbing work as indicated on drawings and specified herein. Work materials and equipment not indicated or specified which is necessary for the complete and proper operation of the work of this Section in accordance with the true intent and meaning of the contract documents shall be provided and incorporated at no additional cost to the Owner.

1.4 QUALITY ASSURANCE

A. Code Requirements: All work covered by this Section shall conform to the latest requirements of the following regulations:

1. C.C.R., Title 24, Part 5 (2022 CPC).
2. 2022 California Plumbing Code.
3. SMACNA Seismic Restraint Manual Guidelines for Mechanical Systems.
4. National Fire Protection Association.
5. California State Division of Industrial Safety.
6. County Health Department.
7. Any other legally constituted body-having jurisdiction thereof.

B. Nothing in the specifications or drawings shall be construed to permit deviation from the requirements of governing codes unless approval for said deviation has been obtained from the legally constituted authorities having jurisdiction and from the Owner's representative.

1.5 PERFORMANCE REQUIREMENTS

A. Components and installation shall be capable of withstanding the following minimum working pressure unless otherwise indicated:

1. Single-Wall Piping Pressure Rating: 10-foot head of water.

A. Delegated Design: Design seismic restraints for aboveground piping, including comprehensive engineering analysis by a qualified professional engineer, using performance requirements and design criteria indicated.

1.6 DRAWINGS

A. Because of the small-scale drawings, it is not possible to indicate all offsets, fittings and accessories which may be required. The Contractor shall carefully investigate the conditions surrounding installation of his work, furnishing the necessary piping, fittings, valves, traps, and other devices which may be required to complete the installation.

B. The general arrangement indicated on the drawings shall be followed as closely as possible. Coordinate with the Architectural, Structural, Mechanical and Electrical Drawings and the work of other trades prior to installation of piping fixtures and equipment to verify adequate space available for installation of the work shown. In the event a field condition arises which makes it impossible to install the work as indicated, submit, in writing, the proposed departures to the Architect for his approval. Only when Architect's approval is given, in writing, shall Contractor proceed with installation of the work.

C. Special Note: Should the Contractor make changes in the installation differing from what is indicated on the contract drawings and not necessitated due to field conditions as indicated hereinabove, the Contractor shall be required to re-install the work to comply with what has been indicated on the contract drawings. Should it be impossible to re-install the work and the installation is in accordance with all governing authorities, the architect may permit the installation to remain. However, all costs incurred to revise the contract drawings by the engineer for resubmittal to the building department indicating the as-installed condition shall become the responsibility of the Contractor.

D. In case of a difference in the specifications or between the specifications and the drawings, the Contractor shall figure the most expensive alternate and after award of contract, shall secure direction from the Architect.

1.7 PERMITS, INSPECTIONS AND LICENSES

A. All permits, inspections and licenses required by the legally constituted authorities for installation of the work according to the plans and specifications shall be obtained and paid as a part of the work of this section.

1.8 EXAMINATION OF PREMISES

A. Before bidding on this work, Contractors shall make a careful examination of the premises and shall thoroughly familiarize themselves with the requirements of the contract. By the act of submitting a proposal for the work included in this contract, the Contractor shall be deemed to have made such study and examination, and that he is familiar with and accepts all conditions of the site.

1.9 PROTECTION

A. All work, equipment and materials shall be protected at all times. Contractor shall make good all damage caused either directly or indirectly by his own workmen. Contractor shall also protect his own work from damage. He shall close all pipe openings with caps or plugs during installation. He shall protect all his equipment and materials against dirt, water, chemical and mechanical injury. Upon completion, all work shall be thoroughly cleaned and delivered in a new condition.

B. Contractor shall be held responsible for all damage to equipment and materials until he has received written notice from the Architect or Engineer that his work has been accepted.

1.10 LOCATIONS

A. The locations of apparatus, piping and equipment indicated on the drawings are approximate. Piping and equipment shall be installed in such a manner as to avoid all obstruction, preserve headroom, and keep openings and passages clear. The locations of and mounting heights of all fixtures shall be coordinated with the architectural plans and room elevations.

B. Clearances and Openings: Contractor shall cooperate and coordinate his work with all other trades to avoid conflict and permit for a neat and orderly appearance of the entire installation. The Contractor shall, in advance of the work, furnish instructions to the General Contractor as to his requirements for equipment and material installation of any kind, whether or not specifically mentioned on drawings or in the specifications, and shall include recesses, chases in walls, and all required openings in the structure. Should furnishing this information be neglected, delayed or incorrect and additional cuttings are found to be required, the cost of the same shall be charged to this Contractor.

C. Contractor shall verify and coordinate pipe routing with location of all electrical rooms, elevator equipment rooms, telecom/data rooms, and other rooms dedicated to the housing of switchgear, panels, or other electrical equipment. In no case shall piping be installed within or above the ceiling of such rooms.

1.11 SUBMITTAL DATA

A. Submittal Requirements:

1. Furnish, all at one time, prior to any installation, within the time noted below, six (6) copies of valid submittal data on all fixtures, material, equipment and devices. Each submitted item shall be indexed and referenced to these specifications and to identification numbers on fixtures and equipment schedules.
2. Manufacturers' submittal literature and shop drawings are required on all items to ensure the latest and most complete manufacturer's data is available for review. Requirements of the submittals and Engineer's submittal notes are a part of the work of this Division except that Engineer's notes may not be used as a means of increasing the scope of work of this Division.
3. Submittals will be checked for general conformance with the design concept of the project but the review does not guarantee quantities shown and does not supersede requirements of this Division to properly install work.
4. To be valid, all submittals must:

    a. Be delivered to the Architect's office within thirty-five (35) days of award of the contract. Contractor shall make time allowance for Engineer's review, return of

comments, if any, and resubmittal if required. Corrections or changes in submittals returned as inadequate or incomplete shall be accomplished within this time limit.

b. Clearly indicate and label as such any items proposed as substitution for that specified or shown on plans.

c. Include all pertinent construction, installation, performance and technical data.

d. Have all product data sheets clearly labeled to indicate the individual items being submitted. In addition, all required options and accessories shall be clearly marked.

1) Product data sheets corresponding to items indicated on plans shall be clearly labeled with the corresponding fixture or equipment tag number.

2) Product data sheets corresponding to items indicated in specifications shall be clearly labeled with the specification section, page and item numbers.

e. Include, for every item which differs in size, configuration, connections, service, accessibility or any other significant way, a drawing to the same (or larger) scale as to the pertinent portions of the contract drawings. In this drawing show a complete layout of the system except that which is identical to the contract drawings, unless the unchanged portions must be shown to indicate such things as clearances. This drawing, together with the contract design drawings must show the complete system as revised to accommodate the proposed alternate.

B. Substitution Requirements:

1. Any items included in submittals and proposed by the Contractor as substitution for that specified or shown on plans shall be submitted within thirty five (35) days of award of the contract. After such time, proposed substitutions shall not be accepted for review, and the Contractor shall submit all items as specified or shown on plans.

a. For each item proposed as substitution for that specified or shown on plans, copies of product data sheets for the specified item shall be placed side by side with product data sheets for the proposed substitution item within the submittal.

1) In addition to the Submittal Requirements for labeling listed above, product data sheets for the specified item shall be clearly labeled “SPECIFIED ITEM, NOT SUBMITTED”. Product data sheets for the corresponding proposed substitution item shall be clearly labeled “PROPOSED SUBSTITUTION”.

b. Provide calculations and other detailed data justifying how any items proposed as substitution were selected for proposal. Data must be complete enough to permit detailed comparison of every significant characteristic for which the specified item was analyzed during design.

2. It shall be the Contractor’s responsibility to provide sufficient information to allow the Engineer to analyze any proposed alternate. If inadequate information is provided, the proposal will not be approved and resubmittal will not be allowed.

3. The Contractor shall provide or perform tests required by Engineer for purpose of judging acceptability of proposed substitutions.

4. The Contractor assumes full responsibility that alternate items and procedures will meet the job requirements and is responsible for cost of redesign and of modifications to this and other parts of work caused by alternate items furnished under work in this Section. In view of these responsibilities, it is the purpose of these specifications to establish procedures to ensure that the Contractor has considered all the ramifications of proposed alternates before submitting them for review. Submittals which do not comply with the

requirements of these specifications or which indicate proposed alternates that were selected without proper regard to the requirements of the job will not be approved. No more than one proposed alternate will be considered for each item.

5. Alternate items installed without Engineer's approval will be replaced with specified items at Contractor's expense.

1.12 INFORMATIONAL SUBMITTALS

A. Seismic Qualification Certificates: For waste and vent piping, accessories, and components, from manufacturer.

1. Basis for Certification: Indicate whether withstand certification is based on actual test of assembled components or on calculation.
2. Detailed description of piping anchorage devices on which the certification is based and their installation requirements.

B. Field quality-control reports.

1.13 QUALITY ASSURANCE

A. Piping materials shall bear label, stamp, or other markings of specified testing agency.

B. Comply with NSF/ANSI 14, "Plastics Piping Systems Components and Related Materials," for plastic piping components. Include marking with "NSF-dwv" for plastic drain, waste, and vent piping and "NSF-sewer" for plastic sewer piping.

1.14 PROJECT CONDITIONS

A. Interruption of Existing Sanitary Waste Service: Do not interrupt service to facilities occupied by Owner or others unless permitted under the following conditions and then only after arranging to provide temporary service according to requirements indicated:

1. Notify Architect no fewer than two days in advance of proposed interruption of sanitary waste service.
2. Do not proceed with interruption of sanitary waste service without Architect's written permission.

1.15 UNINSPECTED WORK

A. The Contractor shall not allow or cause any of his work to be covered up or closed in until it has been inspected, tested, approved by all authorities have jurisdiction, and until Project Record drawings have been properly annotated.

B. Should any of his work be covered up or closed in before such inspection, he shall, at his own expense, uncover the work to the satisfaction of the inspection party. All related repair work cost shall be borne by the Contractor.

1.16 RECORD DRAWINGS (Also see General Conditions)

A. Contractor shall provide and keep up-to-date a complete "as-built" record set of blueline prints which shall show every change from the original drawings and the exact "as-built" locations and sizes of the work provided under this Section of the specifications. This set shall include

locations, dimensions, depth of buried piping, cleanouts, shut-off valves, sewer invert locations, plugged wyes, tees, etc. On completion of the work, the Contractor shall incorporate all as-built information on a set of reproducible tracings provided by the Architect and this set of reproducibles shall be delivered to the Architect.

1.17 GUARANTEES (Also see General Conditions)

A. Contractor shall guarantee the entire plumbing and piping systems unconditionally for a period of one (1) year after final acceptance. If, during this period, any materials, equipment, or any part of the systems fail to function properly, the Contractor shall make good the defects promptly and without any expense to the Owner.

B. Contractor shall be responsible for all damage to any part of the premises caused by leaks in pipelines or equipment furnished and installed under this Section for a period of one (1) year after date of acceptance of his work.

C. All equipment and fixtures shall carry manufacturer's warranty against defective parts or poor workmanship for not less than one (1) year. See specific equipment specifications for extended warranty requirements.

PART 2 - PRODUCTS

2.1 PIPING MATERIALS

A. Comply with requirements in "Piping Schedule" Article for applications of pipe, tube, fitting materials, and joining methods for specific services, service locations, and pipe sizes.

B. Indirect Waste Piping.

1. Shall be Type "L" copper as specified for water piping.

C. Air Conditioning Condensate Drain Piping.

1. Shall be Type "M" copper as specified for water piping.

2.2 COPPER TUBE AND FITTINGS:

A. Hard Copper Tube: ASTM B 88, Type M tube, drawn temper.

B. Wrought-Copper, Solder-Joint Fittings: ASME B16.22, wrought-copper pressure fittings.

C. Copper Unions:

1. MSS SP-123.
2. Cast-copper-alloy, hexagonal-stock body.
3. Ball-and-socket, metal-to-metal seating surfaces.
4. Solder-joint or threaded ends

2.3 SPECIALTY PIPE FITTINGS

A. Dielectric Fittings:

1. General Requirements: Assembly of copper alloy and ferrous materials with separating nonconductive insulating material. Include end connections compatible with pipes to be joined.
2. Dielectric Unions:

a. Manufacturers: Subject to compliance with requirements, provide products by the following:

1) Wilkins; a Zurn company.

b. Description:

1) Standard: ASSE 1079.
2) Pressure Rating: 150 psig.
3) End Connections: Solder-joint copper alloy and threaded ferrous.

PART 3 - EXECUTION

3.1 PIPING INSTALLATION

A. Drawing plans, schematics, and diagrams indicate general location and arrangement of condensate drain piping. Indicated locations and arrangements are used to size pipe and calculate friction loss, expansion, and other design considerations. Install piping as indicated unless deviations to layout are approved on coordination drawings.

B. Install condensate drain piping with 1 percent slope downward toward drain.

C. Install piping in concealed locations unless otherwise indicated and except in equipment rooms and service areas.

D. Install piping indicated to be exposed and piping in equipment rooms and service areas at right angles or parallel to building walls. Diagonal runs are prohibited unless specifically indicated otherwise.

E. Install piping above accessible ceilings to allow sufficient space for ceiling panel removal.

F. Install piping at indicated slopes.

G. Install nipples, unions, special fittings, and valves with pressure ratings the same as or higher than the system pressure rating used in applications below unless otherwise indicated

H. Install piping free of sags and bends.

I. Install fittings for changes in direction and branch connections.

J. Install piping to allow application of insulation.

K. Install unions in copper tubing at connection to each piece of equipment, machine, and specialty.

L. Install seismic restraints on piping. Comply with requirements for seismic-restraint devices specified in Section 220548 "Vibration and Seismic Controls for Plumbing Piping and Equipment."

M. Install aboveground copper tubing according to CDA's "Copper Tube Handbook."

N. Do not enclose, cover, or put piping into operation until it is inspected and approved by authorities having jurisdiction.

O. Install sleeves for piping penetrations of walls, ceilings, and floors. Comply with requirements for sleeves specified in Section 220517 "Sleeves and Sleeve Seals for Plumbing Piping."

P. Install sleeve seals for piping penetrations of concrete walls and slabs. Comply with requirements for sleeve seals specified in Section 220517 "Sleeves and Sleeve Seals for Plumbing Piping."

Q. Install escutcheons for piping penetrations of walls, ceilings, and floors. Comply with requirements for escutcheons specified in Section 220518 "Escutcheons for Plumbing Piping."

3.2 JOINT CONSTRUCTION

A. Threaded Joints: Thread pipe with tapered pipe threads according to ASME B1.20.1. Cut threads full and clean using sharp dies. Ream threaded pipe ends to remove burrs and restore full ID. Join pipe fittings and valves as follows:

1. Apply appropriate tape or thread compound to external pipe threads unless dry seal threading is specified.
2. Damaged Threads: Do not use pipe or pipe fittings with threads that are corroded or damaged. Do not use pipe sections that have cracked or open welds.

B. Join copper tube and fittings with soldered joints according to ASTM B 828. Use ASTM B 813, water-flushable, lead-free flux and ASTM B 32, lead-free-alloy solder.

3.3 SPECIALTY PIPE FITTING INSTALLATION

A. Dielectric Fittings:

1. Install dielectric fittings in piping at connections of dissimilar metal piping and tubing.
2. Dielectric Fittings for NPS 2 and Smaller: Use dielectric unions.

3.4 HANGER AND SUPPORT INSTALLATION

A. Comply with requirements for seismic-restraint devices specified in Section 220548 "Vibration and Seismic Controls for Plumbing Piping and Equipment."

B. Comply with requirements for pipe hanger and support devices and installation specified in Section 220529 "Hangers and Supports for Plumbing Piping and Equipment."

1. Vertical Piping: MSS Type 8 or 42, clamps.
2. Individual, Straight, Horizontal Piping Runs:

a. 100 Feet (30 m) and Less: MSS Type 1, adjustable, steel clevis hangers.
b. Longer Than 100 Feet (30 m): MSS Type 43, adjustable roller hangers.
c. Longer Than 100 Feet (30 m) if Indicated: MSS Type 49, spring cushion rolls.

3. Multiple, Straight, Horizontal Piping Runs 100 Feet (30 m) or Longer: MSS Type 44, pipe rolls. Support pipe rolls on trapeze.
4. Base of Vertical Piping: MSS Type 52, spring hangers
5. Vertical Piping: MSS Type 8 or Type 42, clamps.
6. Install individual, straight, horizontal piping runs:

a. 100 Feet and Less: MSS Type 1, adjustable, steel clevis hangers.
b. Longer Than 100 Feet: MSS Type 43, adjustable roller hangers.
c. Longer Than 100 Feet if Indicated: MSS Type 49, spring cushion rolls.

7. Multiple, Straight, Horizontal Piping Runs 100 Feet or Longer: MSS Type 44, pipe rolls. Support pipe rolls on trapeze.
8. Base of Vertical Piping: MSS Type 52, spring hangers.

C. Support vertical piping and tubing at base and at each floor.

D. Rod diameter may be reduced one size for double-rod hangers, with 3/8-inch minimum rods.

E. Install hangers for copper tubing with the following maximum horizontal spacing and minimum rod diameters:

1. NPS 1-1/4 and Smaller: 72 inches with 3/8-inch rod.

2. NPS 1-1/2 and NPS 2: 96 inches with 3/8-inch rod.

F. Install supports for vertical copper tubing every 10 feet.

G. Support piping and tubing not listed above according to MSS SP-69 and manufacturer's written instructions.

3.5 CONNECTIONS

A. Drawings indicate general arrangement of piping, fittings, and specialties.

B. Connect drainage and vent piping to the following:

1. Plumbing Specialties: Connect drainage piping in sizes indicated, but not smaller than required by plumbing code.

2. Install test tees (wall cleanouts) in conductors near floor.

3. Equipment: Connect drainage piping as indicated. Provide union for each connection.

C. Where installing piping adjacent to equipment, allow space for service and maintenance of equipment.

D. Make connections according to the following unless otherwise indicated:

1. Install unions, in piping NPS 2 and smaller, adjacent to each valve and at final connection to each piece of equipment.

3.6 IDENTIFICATION

A. Identify exposed condensate drain piping. Comply with requirements for identification specified in Section 220553 "Identification for Plumbing Piping and Equipment."

3.7 FIELD QUALITY CONTROL

A. Perform the following tests and inspections:

1. Piping Inspections:

   a. Do not enclose, cover, or put piping into operation until it has been inspected and approved by authorities having jurisdiction.
   b. During installation, notify authorities having jurisdiction at least one day before inspection must be made. Perform tests specified below in presence of authorities having jurisdiction:

      1) Roughing-in Inspection: Arrange for inspection of piping before concealing or closing in after roughing in and before setting fixtures.
      2) Final Inspection: Arrange for authorities having jurisdiction to observe tests specified in "Piping Tests" Subparagraph below and to ensure compliance with requirements.

   c. Reinspection: If authorities having jurisdiction find that piping will not pass tests or inspections, make required corrections and arrange for reinspection.
   d. Reports: Prepare inspection reports and have them signed by authorities having jurisdiction.

2. Piping Tests:

   a. Fill condensate drain piping. Check components to determine that they are not air bound and that piping is full of water.
   b. Test for leaks and defects in new piping and parts of existing piping that have been altered, extended, or repaired. If testing is performed in segments, submit a separate report for each test, complete with diagram of portion of piping tested.
   c. Leave new, altered, extended, or replaced domestic water piping uncovered and unconcealed until it has been tested and approved. Expose work that was covered or concealed before it was tested.
   d. Cap and subject piping to static water pressure of 50 psig. Isolate test source and allow it to stand for four hours. Leaks and loss in test pressure constitute defects that must be repaired.
   e. Repair leaks and defects with new materials, and retest piping or portion thereof until satisfactory results are obtained.
   f. Prepare reports for tests and for corrective action required.

B. Condensate drain piping will be considered defective if it does not pass tests and inspections

C. Reinspection: If authorities having jurisdiction find that piping will not pass test or inspection, make required corrections and arrange for reinspection.

D. Reports: Prepare inspection reports and have them signed by authorities having jurisdiction.

3.8 CLEANING AND PROTECTION

A. Clean interior of piping. Remove dirt and debris as work progresses.

B. Protect drains during remainder of construction period to avoid clogging with dirt and debris and to prevent damage from traffic and construction work.

C. Place plugs in ends of uncompleted piping at end of day and when work stops.

3.9 PIPING SCHEDULE

A. Flanges and unions may be used on aboveground pressure piping unless otherwise indicated.

B. Aboveground, condensate drain piping NPS 2 and smaller, shall be the following:

1. Hard copper tube, ASTM B 88, Type M copper, soilder-joint fittings; and soldered joints.

END OF SECTION 22 16 16

SECTION 22 34 00 - FUEL-FIRED, DOMESTIC-WATER HEATERS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section Includes:

1. Commercial, gas-fired, high-efficiency, storage, domestic-water heaters.
2. Domestic-water heater accessories.

1.3 PERFORMANCE REQUIREMENTS

A. Seismic Performance: Commercial domestic-water heaters shall withstand the effects of earthquake motions determined according to ASCE/SEI 7.

1. The term "withstand" means "the unit will remain in place without separation of any parts from the device when subjected to the seismic forces specified and the unit will be fully operational after the seismic event."

1.4 WORK INCLUDED

A. Furnish all labor, materials, services, testing, transportation and equipment necessary for the completion of all plumbing work as indicated on drawings and specified herein. Work materials and equipment not indicated or specified which is necessary for the complete and proper operation of the work of this Section in accordance with the true intent and meaning of the contract documents shall be provided and incorporated at no additional cost to the Owner.

1.5 QUALITY ASSURANCE

A. Code Requirements: All work covered by this Section shall conform to the latest requirements of the following regulations:

1. C.C.R., Title 24, Part 5 (2019 CPC).
2. 2019 California Plumbing Code.
3. SMACNA Seismic Restraint Manual Guidelines for Mechanical Systems.
4. National Fire Protection Association.
5. California State Division of Industrial Safety.
6. County Health Department.
7. Any other legally constituted body-having jurisdiction thereof.

B. Nothing in the specifications or drawings shall be construed to permit deviation from the requirements of governing codes unless approval for said deviation has been obtained from the legally constituted authorities having jurisdiction and from the Owner's representative.

1.6 DRAWINGS

A. Because of the small-scale drawings, it is not possible to indicate all offsets, fittings and accessories which may be required. The Contractor shall carefully investigate the conditions surrounding installation of his work, furnishing the necessary piping, fittings, valves, traps, and other devices which may be required to complete the installation.

B. The general arrangement indicated on the drawings shall be followed as closely as possible. Coordinate with the Architectural, Structural, Mechanical and Electrical Drawings and the work of other trades prior to installation of piping fixtures and equipment to verify adequate space available for installation of the work shown. In the event a field condition arises which makes it impossible to install the work as indicated, submit, in writing, the proposed departures to the Architect for his approval. Only when Architect's approval is given, in writing, shall Contractor proceed with installation of the work.

C. Special Note: Should the Contractor make changes in the installation differing from what is indicated on the contract drawings and not necessitated due to field conditions as indicated hereinabove, the Contractor shall be required to re-install the work to comply with what has been indicated on the contract drawings. Should it be impossible to re-install the work and the installation is in accordance with all governing authorities, the architect may permit the installation to remain. However, all costs incurred to revise the contract drawings by the engineer for resubmittal to the building department indicating the as-installed condition shall become the responsibility of the Contractor.

D. In case of a difference in the specifications or between the specifications and the drawings, the Contractor shall figure the most expensive alternate and after award of contract, shall secure direction from the Architect.

1.7 PERMITS, INSPECTIONS AND LICENSES

A. All permits, inspections and licenses required by the legally constituted authorities for installation of the work according to the plans and specifications shall be obtained and paid as a part of the work of this section.

1.8 EXAMINATION OF PREMISES

A. Before bidding on this work, Contractors shall make a careful examination of the premises and shall thoroughly familiarize themselves with the requirements of the contract. By the act of submitting a proposal for the work included in this contract, the Contractor shall be deemed to have made such study and examination, and that he is familiar with and accepts all conditions of the site.

1.9 PROTECTION

A. All work, equipment and materials shall be protected at all times. Contractor shall make good all damage caused either directly or indirectly by his own workmen. Contractor shall also protect his own work from damage. He shall close all pipe openings with caps or plugs during

installation. He shall protect all his equipment and materials against dirt, water, chemical and mechanical injury. Upon completion, all work shall be thoroughly cleaned and delivered in a new condition.

B. Contractor shall be held responsible for all damage to equipment and materials until he has received written notice from the Architect or Engineer that his work has been accepted.

1.10 LOCATIONS

A. The locations of apparatus, piping and equipment indicated on the drawings are approximate. Piping and equipment shall be installed in such a manner as to avoid all obstruction, preserve headroom, and keep openings and passages clear. The locations of and mounting heights of all fixtures shall be coordinated with the architectural plans and room elevations.

B. Clearances and Openings: Contractor shall cooperate and coordinate his work with all other trades to avoid conflict and permit for a neat and orderly appearance of the entire installation. The Contractor shall, in advance of the work, furnish instructions to the General Contractor as to his requirements for equipment and material installation of any kind, whether or not specifically mentioned on drawings or in the specifications, and shall include recesses, chases in walls, and all required openings in the structure. Should furnishing this information be neglected, delayed or incorrect and additional cuttings are found to be required, the cost of the same shall be charged to this Contractor.

C. Contractor shall verify and coordinate pipe routing with location of all electrical rooms, elevator equipment rooms, telecom/data rooms, and other rooms dedicated to the housing of switchgear, panels, or other electrical equipment. In no case shall piping be installed within or above the ceiling of such rooms.

1.11 SUBMITTAL DATA

A. Submittal Requirements:

1. Furnish, all at one time, prior to any installation, within the time noted below, six (6) copies of valid submittal data on all fixtures, material, equipment and devices. Each submitted item shall be indexed and referenced to these specifications and to identification numbers on fixtures and equipment schedules.
2. Manufacturers’ submittal literature and shop drawings are required on all items to ensure the latest and most complete manufacturer's data is available for review. Requirements of the submittals and Engineer's submittal notes are a part of the work of this Division except that Engineer's notes may not be used as a means of increasing the scope of work of this Division.
3. Submittals will be checked for general conformance with the design concept of the project but the review does not guarantee quantities shown and does not supersede requirements of this Division to properly install work.
4. To be valid, all submittals must:

    a. Be delivered to the Architect's office within thirty-five (35) days of award of the contract. Contractor shall make time allowance for Engineer’s review, return of comments, if any, and resubmittal if required. Corrections or changes in submittals returned as inadequate or incomplete shall be accomplished within this time limit.
    b. Clearly indicate and label as such any items proposed as substitution for that specified or shown on plans.
    c. Include all pertinent construction, installation, performance and technical data.

d. Have all product data sheets clearly labeled to indicate the individual items being submitted. In addition, all required options and accessories shall be clearly marked.

1) Product data sheets corresponding to items indicated on plans shall be clearly labeled with the corresponding fixture or equipment tag number.
2) Product data sheets corresponding to items indicated in specifications shall be clearly labeled with the specification section, page and item numbers.

e. Include, for every item which differs in size, configuration, connections, service, accessibility or any other significant way, a drawing to the same (or larger) scale as to the pertinent portions of the contract drawings. In this drawing show a complete layout of the system except that which is identical to the contract drawings, unless the unchanged portions must be shown to indicate such things as clearances. This drawing, together with the contract design drawings must show the complete system as revised to accommodate the proposed alternate.

B. Substitution Requirements:

1. Any items included in submittals and proposed by the Contractor as substitution for that specified or shown on plans shall be submitted within thirty five (35) days of award of the contract. After such time, proposed substitutions shall not be accepted for review, and the Contractor shall submit all items as specified or shown on plans.

a. For each item proposed as substitution for that specified or shown on plans, copies of product data sheets for the specified item shall be placed side by side with product data sheets for the proposed substitution item within the submittal.

1) In addition to the Submittal Requirements for labeling listed above, product data sheets for the specified item shall be clearly labeled “SPECIFIED ITEM, NOT SUBMITTED”. Product data sheets for the corresponding proposed substitution item shall be clearly labeled “PROPOSED SUBSTITUTION”.

b. Provide calculations and other detailed data justifying how any items proposed as substitution were selected for proposal. Data must be complete enough to permit detailed comparison of every significant characteristic for which the specified item was analyzed during design.

2. It shall be the Contractor’s responsibility to provide sufficient information to allow the Engineer to analyze any proposed alternate. If inadequate information is provided, the proposal will not be approved and resubmittal will not be allowed.
3. The Contractor shall provide or perform tests required by Engineer for purpose of judging acceptability of proposed substitutions.
4. The Contractor assumes full responsibility that alternate items and procedures will meet the job requirements and is responsible for cost of redesign and of modifications to this and other parts of work caused by alternate items furnished under work in this Section. In view of these responsibilities, it is the purpose of these specifications to establish procedures to ensure that the Contractor has considered all the ramifications of proposed alternates before submitting them for review. Submittals which do not comply with the requirements of these specifications or which indicate proposed alternates that were selected without proper regard to the requirements of the job will not be approved. No more than one proposed alternate will be considered for each item.
5. Alternate items installed without Engineer's approval will be replaced with specified items at Contractor's expense.

6. The Architect or his authorized representative shall be the sole judge as to the quality and suitability of proposed alternate equipment, fixtures or materials. Decisions of the Architect or that of his representative shall be final and conclusive.

1.12 UNINSPECTED WORK

A. The Contractor shall not allow or cause any of his work to be covered up or closed in until it has been inspected, tested, approved by all authorities have jurisdiction, and until Project Record drawings have been properly annotated.

1.13 QUALITY ASSURANCE

A. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.

B. ASHRAE/IESNA Compliance: Fabricate and label fuel-fired, domestic-water heaters to comply with ASHRAE/IESNA 90.1.

C. ASME Compliance:

1. Where ASME-code construction is indicated, fabricate and label commercial, domestic-water heater storage tanks to comply with ASME Boiler and Pressure Vessel Code: Section VIII, Division 1.

D. NSF Compliance: Fabricate and label equipment components that will be in contact with potable water to comply with NSF 61, "Drinking Water System Components - Health Effects."

1.14 COORDINATION

A. Coordinate sizes and locations of concrete bases with actual equipment provided.

1.15 RECORD DRAWINGS (Also see General Conditions)

A. Contractor shall provide and keep up-to-date a complete "as-built" record set of blueline prints which shall show every change from the original drawings and the exact "as-built" locations and sizes of the work provided under this Section of the specifications. This set shall include locations, dimensions, depth of buried piping, cleanouts, shut-off valves, sewer invert locations, plugged wyes, tees, etc. On completion of the work, the Contractor shall incorporate all as-built information on a set of reproducible tracings provided by the Architect and this set of reproducibles shall be delivered to the Architect.

1.16 WARRANTY

A. Contractor shall guarantee the entire plumbing and piping systems unconditionally for a period of one (1) year after final acceptance. If, during this period, any materials, equipment, or any part of the systems fail to function properly, the Contractor shall make good the defects promptly and without any expense to the Owner.

B. Contractor shall be responsible for all damage to any part of the premises caused by leaks in pipelines or equipment furnished and installed under this Section for a period of one (1) year after date of acceptance of his work.

C. Special Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace components of fuel-fired, domestic-water heaters that fail in materials or workmanship within specified warranty period.

1. Failures include, but are not limited to, the following:

a. Structural failures including storage tank and supports.
b. Faulty operation of controls.
c. Deterioration of metals, metal finishes, and other materials beyond normal use.

2. Warranty Periods: From date of Substantial Completion.

a. Commercial, Gas-Fired, Storage, Domestic-Water Heaters:

1) Storage Tank: Five years.
2) Controls and Other Components: Two years.

b. Compression Tanks: Five years.

PART 2 - PRODUCTS

2.1 COMMERCIAL, GAS-FIRED, STORAGE, WATER HEATERS

A. Commercial, Gas-Fired, High-Efficiency, Storage, Domestic-Water Heaters:

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

a. AO Smith.
b. Bradford White
c. Rheem
d. Lochinvar.

2. Standard: ANSI Z21.10.3/CSA 4.3.
3. Description: Manufacturer's proprietary design to provide at least 84 percent combustion efficiency at optimum operating conditions.
4. Storage-Tank Construction: ASME-code steel with 150-psig minimum working-pressure rating.

a. Tappings: Factory fabricated of materials compatible with tank. Attach tappings to tank before testing.

1) NPS 2 and Smaller: Threaded ends according to ASME B1.20.1.
2) NPS 2-1/2 and Larger: Flanged ends according to ASME B16.5 for steel and stainless-steel flanges and according to ASME B16.24 for copper and copper-alloy flanges.

b. Interior Finish: Comply with NSF 61 barrier materials for potable-water tank linings, including extending finish into and through tank fittings and outlets.

5. Factory-Installed Storage-Tank Appurtenances:

   a. Anode Rod: Replaceable magnesium.
   b. Dip Tube: Required unless cold-water inlet is near bottom of tank.
   c. Drain Valve: Corrosion-resistant metal complying with ASSE 1005.
   d. Insulation: Comply with ASHRAE/IESNA 90.1. Surround entire storage tank except connections and controls.
   e. Jacket: Steel with enameled finish.
   f. Burner or Heat Exchanger: Comply with UL 795 or approved testing agency requirements for gas-fired, high-efficiency, domestic-water heaters and natural-gas fuel.
   g. Temperature Control: Adjustable thermostat.
   h. Safety Controls: Automatic, high-temperature-limit and low-water cutoff devices or systems.
   i. Combination Temperature-and-Pressure Relief Valves: ANSI Z21.22/CSA 4.4-M. Include one or more relief valves with total relieving capacity at least as great as heat input, and include pressure setting less than domestic-water heater working-pressure rating. Select one relief valve with sensing element that extends into storage tank.

B. Capacity and Characteristics: See Water Heater Schedule.

2.2 WATER HEATER ACCESSORIES

A. Domestic-Water Compression Tanks:

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

   a. Wilkins.
   b. AMTROL Inc.
   c. Smith, A. O. Water Products Co.; a division of A. O. Smith Corporation.
   d. Taco, Inc.

2. Description: Steel, pressure-rated tank constructed with welded joints and factory-installed butyl-rubber diaphragm. Include air precharge to minimum system-operating pressure at tank.

3. Construction:

   a. Tappings: Factory-fabricated steel, welded to tank before testing and labeling. Include ASME B1.20.1 pipe thread.
   b. Interior Finish: Comply with NSF 61 barrier materials for potable-water tank linings, including extending finish into and through tank fittings and outlets.
   c. Air-Charging Valve: Factory installed.

4. Capacity and Characteristics:

   a. Working-Pressure Rating: 150 psig.
   b. Capacity Acceptable: 4 gal. minimum.

5. Tank Cage:

   a. Mapa

B. Drain Pans: Corrosion-resistant metal with raised edge. Comply with ANSI/CSA LC 3. Include dimensions not less than base of domestic-water heater, and include drain outlet not less than NPS 3/4 with ASME B1.20.1 pipe threads or with ASME B1.20.7 garden-hose threads.

C. Piping-Type Heat Traps: Field-fabricated piping arrangement according to ASHRAE/IESNA 90.1 or ASHRAE 90.2.

D. Gas Shutoff Valves: ANSI Z21.15/CSA 9.1-M, manually operated. Furnish for installation in piping.

E. Combination Temperature-and-Pressure Relief Valves: Include relieving capacity at least as great as heat input, and include pressure setting less than domestic-water heater working-pressure rating. Select relief valves with sensing element that extends into storage tank.

1. Gas-Fired, Domestic-Water Heaters: ANSI Z21.22/CSA 4.4-M.

F. Vacuum Relief Valves: ANSI Z21.22/CSA 4.4-M.

G. Domestic-Water Heater Stands: Manufacturer's factory-fabricated steel stand for floor mounting, capable of supporting domestic-water heater and water. Provide dimension that will support bottom of domestic-water heater a minimum of 18 inches above the floor.

H. Domestic-Water Heater Mounting Brackets: Manufacturer's factory-fabricated steel bracket for wall mounting, capable of supporting domestic-water heater and water.

I. Indirect Waste Piping:

1. Shall be Type "L" copper as specified for water piping.

2.3 SOURCE QUALITY CONTROL

A. Factory Tests: Test and inspect assembled domestic-water heaters specified to be ASME-code construction, according to ASME Boiler and Pressure Vessel Code.

B. Hydrostatically test commercial domestic-water heaters to minimum of one and one-half times pressure rating before shipment.

C. Domestic-water heaters will be considered defective if they do not pass tests and inspections. Comply with requirements in Section 014000 "Quality Requirements" for retesting and reinspecting requirements and Section 017300 "Execution" for requirements for correcting the Work.

D. Prepare test and inspection reports.

PART 3 - EXECUTION

3.1 WATER HEATER INSTALLATION

A. Commercial, Domestic-Water Heater Mounting: Install commercial domestic-water heaters on concrete base. Comply with requirements for concrete base specified in Section 033000 "Cast-in-Place Concrete."

1. Maintain manufacturer's recommended clearances.
2. Arrange units so controls and devices that require servicing are accessible.
3. For supported equipment, install epoxy-coated anchor bolts that extend through concrete base and anchor into structural concrete floor.
4. Place and secure anchorage devices. Use setting drawings, templates, diagrams, instructions, and directions furnished with items to be embedded.
5. Install anchor bolts to elevations required for proper attachment to supported equipment.
6. Anchor domestic-water heaters to substrate.

B. Install water heaters level and plumb, according to layout drawings, original design, and referenced standards. Maintain manufacturer's recommended clearances. Arrange units so controls and devices needing service are accessible.

1. Install shutoff valves on domestic-water-supply piping to domestic-water heaters and on domestic-hot-water outlet piping. Comply with requirements for shutoff valves specified in Section 220523 "General-Duty Valves for Plumbing Piping."

C. Install gas-fired, domestic-water heaters according to NFPA 54.

1. Install gas shutoff valves on gas supply piping to gas-fired, domestic-water heaters without shutoff valves.

D. Install commercial domestic-water heaters with seismic-restraint devices. Comply with requirements for seismic-restraint devices specified in Section 220548 "Vibration and Seismic Controls for Plumbing Piping and Equipment."

E. Install combination temperature-and-pressure relief valves in top portion of storage tanks. Use relief valves with sensing elements that extend into tanks. Extend commercial-water-heater relief-valve outlet, with drain piping same as domestic-water piping in continuous downward pitch, and discharge by positive air gap onto closest floor drain.

F. Install water-heater drain piping as indirect waste to spill by positive air gap into open drains or over floor drains. Install hose-end drain valves at low points in water piping for domestic-water heaters that do not have tank drains. Comply with requirements for hose-end drain valves specified in Section 221119 "Domestic Water Piping Specialties."

G. Install thermometer on outlet piping of domestic-water heaters. Comply with requirements for thermometers specified in Section 220519 "Meters and Gages for Plumbing Piping."

H. Fill domestic-water heaters with water.

I. Charge domestic-water compression tanks with air.

3.2 CONNECTIONS

A. Comply with requirements for domestic-water piping specified in Section 221116 "Domestic Water Piping."

B. Comply with requirements for gas piping specified in Section 221123 "Facility Natural-Gas Piping."

C. Drawings indicate general arrangement of piping, fittings, and specialties.

D. Where installing piping adjacent to fuel-fired, domestic-water heaters, allow space for service and maintenance of water heaters. Arrange piping for easy removal of domestic-water heaters.

3.3 IDENTIFICATION

A. Identify system components. Comply with requirements for identification specified in Section 220553 "Identification for Plumbing Piping and Equipment."

3.4 FIELD QUALITY CONTROL

A. Perform tests and inspections.

1. Manufacturer's Field Service: Engage a factory-authorized service representative to inspect components, assemblies, and equipment installations, including connections, and to assist in testing.
2. Leak Test: After installation, charge system and test for leaks. Repair leaks and retest until no leaks exist.
3. Operational Test: After electrical circuitry has been energized, start units to confirm proper operation.
4. Test and adjust controls and safeties. Replace damaged and malfunctioning controls and equipment.

B. Domestic-water heaters will be considered defective if they do not pass tests and inspections. Comply with requirements in Section 014000 "Quality Requirements" for retesting and reinspecting requirements and Section 017300 "Execution" for requirements for correcting the Work.

C. Prepare test and inspection reports.

3.5 DEMONSTRATION

A. Engage a factory-authorized service representative to train Owner's maintenance personnel to adjust, operate, and maintain commercial, gas-fired, storage, domestic-water heaters.

END OF SECTION 22 34 00

SECTION 22 42 13 13 - COMMERCIAL WATER CLOSETS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section Includes:

1. Water closets.
2. Flushometer valves.
3. Toilet seats.

1.3 WORK INCLUDED

A. Furnish all labor, materials, services, testing, transportation and equipment necessary for the completion of all plumbing work as indicated on drawings and specified herein. Work materials and equipment not indicated or specified which is necessary for the complete and proper operation of the work of this Section in accordance with the true intent and meaning of the contract documents shall be provided and incorporated at no additional cost to the Owner.

1.4 QUALITY ASSURANCE

A. Code Requirements: All work covered by this Section shall conform to the latest requirements of the following regulations:

1. C.C.R., Title 24, Part 5 (2022 CPC).
2. 2022 California Plumbing Code.
3. SMACNA Seismic Restraint Manual Guidelines for Mechanical Systems.
4. National Fire Protection Association.
5. California State Division of Industrial Safety.
6. County Health Department.
7. Any other legally constituted body-having jurisdiction thereof.
8. Plumbing fixtures and accessories provided in a toilet room or bathing room required to comply with CBC Section 11B-213.2 shall comply with CBC Section 11B-213.3.
9. Access plumbing fixtures shall comply with all of the requirements of CBC Division 6.
10. Clearance around accessible water closets and in toilet compartments shall be 60 inches minimum measured perpendicular from the side wall and 56 inches minimum measured perpendicular from the rear wall per CBC Section 11B-604.3.1.
11. Heights and location of all fixtures shall be mounted according to CBC Sections 11B-602 through 11B-612.
12. Accessible fixture controls shall comply with CBC Sections 11B-604.6 for water closets and 11B-604.9.5 for children’s water closets.

B. Nothing in the specifications or drawings shall be construed to permit deviation from the requirements of governing codes unless approval for said deviation has been obtained from the legally constituted authorities having jurisdiction and from the Owner's representative.

1.5 DRAWINGS

A. Because of the small-scale drawings, it is not possible to indicate all offsets, fittings and accessories which may be required. The Contractor shall carefully investigate the conditions surrounding installation of his work, furnishing the necessary piping, fittings, valves, traps, and other devices which may be required to complete the installation.

B. The general arrangement indicated on the drawings shall be followed as closely as possible. Coordinate with the Architectural, Structural, Mechanical and Electrical Drawings and the work of other trades prior to installation of piping fixtures and equipment to verify adequate space available for installation of the work shown. In the event a field condition arises which makes it impossible to install the work as indicated, submit, in writing, the proposed departures to the Architect for his approval. Only when Architect's approval is given, in writing, shall Contractor proceed with installation of the work.

C. Special Note: Should the Contractor make changes in the installation differing from what is indicated on the contract drawings and not necessitated due to field conditions as indicated hereinabove, the Contractor shall be required to re-install the work to comply with what has been indicated on the contract drawings. Should it be impossible to re-install the work and the installation is in accordance with all governing authorities, the architect may permit the installation to remain. However, all costs incurred to revise the contract drawings by the engineer for resubmittal to the building department indicating the as-installed condition shall become the responsibility of the Contractor.

D. In case of a difference in the specifications or between the specifications and the drawings, the Contractor shall figure the most expensive alternate and after award of contract, shall secure direction from the Architect.

1.6 PERMITS, INSPECTIONS AND LICENSES

A. All permits, inspections and licenses required by the legally constituted authorities for installation of the work according to the plans and specifications shall be obtained and paid as a part of the work of this section.

1.7 EXAMINATION OF PREMISES

A. Before bidding on this work, Contractors shall make a careful examination of the premises and shall thoroughly familiarize themselves with the requirements of the contract. By the act of submitting a proposal for the work included in this contract, the Contractor shall be deemed to have made such study and examination, and that he is familiar with and accepts all conditions of the site.

1.8 PROTECTION

A. All work, equipment and materials shall be protected at all times. Contractor shall make good all damage caused either directly or indirectly by his own workmen. Contractor shall also protect his own work from damage. He shall close all pipe openings with caps or plugs during

installation. He shall protect all his equipment and materials against dirt, water, chemical and mechanical injury. Upon completion, all work shall be thoroughly cleaned and delivered in a new condition.

B. Contractor shall be held responsible for all damage to equipment and materials until he has received written notice from the Architect or Engineer that his work has been accepted.

1.9 LOCATIONS

A. The locations of apparatus, piping and equipment indicated on the drawings are approximate. Piping and equipment shall be installed in such a manner as to avoid all obstruction, preserve headroom, and keep openings and passages clear. The locations of and mounting heights of all fixtures shall be coordinated with the architectural plans and room elevations.

B. Clearances and Openings: Contractor shall cooperate and coordinate his work with all other trades to avoid conflict and permit for a neat and orderly appearance of the entire installation. The Contractor shall, in advance of the work, furnish instructions to the General Contractor as to his requirements for equipment and material installation of any kind, whether or not specifically mentioned on drawings or in the specifications, and shall include recesses, chases in walls, and all required openings in the structure. Should furnishing this information be neglected, delayed or incorrect and additional cuttings are found to be required, the cost of the same shall be charged to this Contractor.

C. Contractor shall verify and coordinate pipe routing with location of all electrical rooms, elevator equipment rooms, telecom/data rooms, and other rooms dedicated to the housing of switchgear, panels, or other electrical equipment. In no case shall piping be installed within or above the ceiling of such rooms.

1.10 SUBMITTAL DATA

A. Submittal Requirements:

1. Furnish, all at one time, prior to any installation, within the time noted below, six (6) copies of valid submittal data on all fixtures, material, equipment and devices. Each submitted item shall be indexed and referenced to these specifications and to identification numbers on fixtures and equipment schedules.
2. Manufacturers’ submittal literature and shop drawings are required on all items to ensure the latest and most complete manufacturer's data is available for review. Requirements of the submittals and Engineer's submittal notes are a part of the work of this Division except that Engineer's notes may not be used as a means of increasing the scope of work of this Division.
3. Submittals will be checked for general conformance with the design concept of the project but the review does not guarantee quantities shown and does not supersede requirements of this Division to properly install work.
4. To be valid, all submittals must:

    a. Be delivered to the Architect's office within thirty-five (35) days of award of the contract. Contractor shall make time allowance for Engineer’s review, return of comments, if any, and resubmittal if required. Corrections or changes in submittals returned as inadequate or incomplete shall be accomplished within this time limit.
    b. Clearly indicate and label as such any items proposed as substitution for that specified or shown on plans.
    c. Include all pertinent construction, installation, performance and technical data.

d. Have all product data sheets clearly labeled to indicate the individual items being submitted. In addition, all required options and accessories shall be clearly marked.

1) Product data sheets corresponding to items indicated on plans shall be clearly labeled with the corresponding fixture or equipment tag number.
2) Product data sheets corresponding to items indicated in specifications shall be clearly labeled with the specification section, page and item numbers.

e. Include, for every item which differs in size, configuration, connections, service, accessibility or any other significant way, a drawing to the same (or larger) scale as to the pertinent portions of the contract drawings. In this drawing show a complete layout of the system except that which is identical to the contract drawings, unless the unchanged portions must be shown to indicate such things as clearances. This drawing, together with the contract design drawings must show the complete system as revised to accommodate the proposed alternate.

B. Substitution Requirements:

1. Any items included in submittals and proposed by the Contractor as substitution for that specified or shown on plans shall be submitted within thirty five (35) days of award of the contract. After such time, proposed substitutions shall not be accepted for review, and the Contractor shall submit all items as specified or shown on plans.

a. For each item proposed as substitution for that specified or shown on plans, copies of product data sheets for the specified item shall be placed side by side with product data sheets for the proposed substitution item within the submittal.

1) In addition to the Submittal Requirements for labeling listed above, product data sheets for the specified item shall be clearly labeled “SPECIFIED ITEM, NOT SUBMITTED”. Product data sheets for the corresponding proposed substitution item shall be clearly labeled “PROPOSED SUBSTITUTION”.

b. Provide calculations and other detailed data justifying how any items proposed as substitution were selected for proposal. Data must be complete enough to permit detailed comparison of every significant characteristic for which the specified item was analyzed during design.

2. It shall be the Contractor’s responsibility to provide sufficient information to allow the Engineer to analyze any proposed alternate. If inadequate information is provided, the proposal will not be approved and resubmittal will not be allowed.
3. The Contractor shall provide or perform tests required by Engineer for purpose of judging acceptability of proposed substitutions.
4. The Contractor assumes full responsibility that alternate items and procedures will meet the job requirements and is responsible for cost of redesign and of modifications to this and other parts of work caused by alternate items furnished under work in this Section. In view of these responsibilities, it is the purpose of these specifications to establish procedures to ensure that the Contractor has considered all the ramifications of proposed alternates before submitting them for review. Submittals which do not comply with the requirements of these specifications or which indicate proposed alternates that were selected without proper regard to the requirements of the job will not be approved. No more than one proposed alternate will be considered for each item.
5. Alternate items installed without Engineer's approval will be replaced with specified items at Contractor's expense.

6. The Architect or his authorized representative shall be the sole judge as to the quality and suitability of proposed alternate equipment, fixtures or materials. Decisions of the Architect or that of his representative shall be final and conclusive.

1.11 MAINTENANCE MATERIAL SUBMITTALS

A. Furnish extra materials that are packaged with protective covering for storage and identified with labels describing contents.

1. Flushometer-Valve Repair Kits: Equal to 10 percent of amount of each type installed, but no fewer than six of each type.

1.12 UNINSPECTED WORK

A. The Contractor shall not allow or cause any of his work to be covered up or closed in until it has been inspected, tested, approved by all authorities have jurisdiction, and until Project Record drawings have been properly annotated.

B. Should any of his work be covered up or closed in before such inspection, he shall, at his own expense, uncover the work to the satisfaction of the inspection party. All related repair work cost shall be borne by the Contractor.

1.13 RECORD DRAWINGS (Also see General Conditions)

A. Contractor shall provide and keep up-to-date a complete "as-built" record set of blueline prints which shall show every change from the original drawings and the exact "as-built" locations and sizes of the work provided under this Section of the specifications. This set shall include locations, dimensions, depth of buried piping, cleanouts, shut-off valves, sewer invert locations, plugged wyes, tees, etc. On completion of the work, the Contractor shall incorporate all as-built information on a set of reproducible tracings provided by the Architect and this set of reproducibles shall be delivered to the Architect.

1.14 GUARANTEES (Also see General Conditions)

A. Contractor shall guarantee the entire plumbing and piping systems unconditionally for a period of one (1) year after final acceptance. If, during this period, any materials, equipment, or any part of the systems fail to function properly, the Contractor shall make good the defects promptly and without any expense to the Owner.

B. Contractor shall be responsible for all damage to any part of the premises caused by leaks in pipelines or equipment furnished and installed under this Section for a period of one (1) year after date of acceptance of his work.

C. All equipment and fixtures shall carry manufacturer's warranty against defective parts or poor workmanship for not less than one (1) year. See specific equipment specifications for extended warranty requirements.

PART 2 - PRODUCTS

2.1 Equipment and Fixtures:

A. Fixtures:

1. See schedule on drawings.

2.2 WALL-MOUNTED WATER CLOSETS

A. Water Closets: Wall mounted, top spud.

1. Basis-of-Design Product: Subject to compliance with requirements, provide product indicated on Drawings or comparable product by one of the following:

   a. American Standard America.
   b. Kohler Co.

2. Bowl:

   a. Standards: ASME A112.19.2/CSA B45.1 and ASME A112.19.5.
   b. Material: Vitreous china.
   c. Type: Siphon jet.
   d. Style: Flushometer valve.
   e. Height: Standard.
   f. Rim Contour: Elongated.
   g. Water Consumption: 1.28 gal. (4.8 L) per flush.
   h. Spud Size and Location: NPS 1-1/2 (DN 40); top.

3. Support:

   a. Basis-of-Design Product: Subject to compliance with requirements, provide product indicated on Drawings or comparable product by one of the following:

      1) ZURN 1200 SERIES “EZCARY” CARRIERS

   b. Standard: ASME A112.6.1M.
   c. Description: Waste-fitting assembly as required to match drainage piping material and arrangement with faceplates, couplings gaskets, and feet; bolts and hardware matching fixture. Include additional extension coupling, faceplate, and feet for installation in wide pipe space.

2.3 FLUSHOMETER VALVES

A. Lever-Handle, Diaphragm Flushometer Valves:

1. Manufacturers: Subject to compliance with requirements, provide products by the following:
2. Basis-of-Design Product: Subject to compliance with requirements, provide product indicated on Drawings or comparable product by one of the following:

   a. Sloan Valve Company.

3. Standard: ASSE 1037.
4. Minimum Pressure Rating: 125 psig (860 kPa).
5. Features: Include integral check stop and backflow-prevention device.
6. Material: Brass body with corrosion-resistant components.
7. Exposed Flushometer-Valve Finish: Chrome plated.
8. Panel Finish: Chrome plated or stainless steel.
9. Style: Exposed.
10. Consumption: 1.28 gal. (4.8 L) per flush.
11. Minimum Inlet: NPS 1 (DN 25).
12. Minimum Outlet: NPS 1-1/4 (DN 32).

2.4 TOILET SEATS

A. Toilet Seats:

1. Manufacturers: Subject to compliance with requirements, provide products by the following:
2. Basis-of-Design Product: Subject to compliance with requirements, provide product indicated on Drawings or comparable product by one of the following:

   a. Bemis Manufacturing Company.
   b. Olsonite Seat Co.

3. Standard: IAPMO/ANSI Z124.5.
4. Material: Plastic.
5. Type: Commercial (Standard).
6. Shape: Elongated rim, open front.
7. Hinge: Self-sustaining, check.
8. Hinge Material: Noncorroding metal.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Locations and Accessibility: Install equipment for ease of maintenance and repair. If changes in the indicated locations or arrangements are made by the Contractor, they shall be made without additional charges.

B. Openings: Furnish information to the other trades on size and location of openings which are required in walls, slabs, roof, for piping and equipment at the proper times.

C. Proceed with installation only after unsatisfactory conditions have been corrected.

D. Closing-In of Uninspected Work: Do not allow or cause any of the work to be covered up or enclosed until it has been inspected, tested, and approved by the Architect. Any work enclosed or covered prior to such inspection and test shall be uncovered and, after it has been inspected, tested, and approved, make all repairs with such materials as may be necessary to restore all work, including that of other trades, to its original and proper condition.

3.2 INSTALLATION

A. Water-Closet Installation:

1. Install level and plumb according to roughing-in drawings.
2. Install accessible, wall-mounted water closets at mounting height for handicapped/elderly, according to ICC/ANSI A117.1.

B. Flushometer-Valve Installation:

1. Install flushometer-valve, water-supply fitting on each supply to each water closet.
2. Attach supply piping to supports or substrate within pipe spaces behind fixtures.
3. Install lever-handle flushometer valves for accessible water closets with handle mounted on open side of water closet.

C. Install toilet seats on water closets.

D. Wall Flange and Escutcheon Installation:

1. Install wall flanges or escutcheons at piping wall penetrations in exposed, finished locations and within cabinets and millwork.
2. Install deep-pattern escutcheons if required to conceal protruding fittings.
3. Comply with escutcheon requirements specified in Section 220518 "Escutcheons for Plumbing Piping."

E. Joint Sealing:

1. Seal joints between water closets and walls and floors using sanitary-type, one-part, mildew-resistant silicone sealant.
2. Match sealant color to water-closet color.
3. Comply with sealant requirements specified in Section 079200 "Joint Sealants."

3.3 CONNECTIONS

A. Connect water closets with water supplies and soil, waste, and vent piping. Use size fittings required to match water closets.

B. Comply with water piping requirements specified in Section 221116 "Domestic Water Piping."

C. Comply with soil and waste piping requirements specified in Section 221316 "Sanitary Waste and Vent Piping."

D. Where installing piping adjacent to water closets, allow space for service and maintenance.

3.4 ADJUSTING

A. Operate and adjust water closets and controls. Replace damaged and malfunctioning water closets, fittings, and controls.

B. Adjust water pressure at flushometer valves to produce proper flow.

C. Install fresh batteries in battery-powered, electronic-sensor mechanisms.

3.5 CLEANING AND PROTECTION

A. Clean water closets and fittings with manufacturers' recommended cleaning methods and materials.

B. Install protective covering for installed water closets and fittings.

C. Do not allow use of water closets for temporary facilities unless approved in writing by Owner.

3.6 PLUMBING FIXTURES

A. Accessible plumbing fixtures shall comply with all of the requirements of CBC Division 6.

B. Heights and location of all accessible fixtures shall be mounted according to CBC Sections 11B-602 through 11B-612.

C. Fixture controls shall comply with CBC Sections 11B-604.6 for water closets

END OF SECTION 22 42 13 13

SECTION 22 42 13 16 - COMMERCIAL URINALS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section Includes:

1. Urinals.
2. Flushometer valves.

1.3 WORK INCLUDED

A. Furnish all labor, materials, services, testing, transportation and equipment necessary for the completion of all plumbing work as indicated on drawings and specified herein. Work materials and equipment not indicated or specified which is necessary for the complete and proper operation of the work of this Section in accordance with the true intent and meaning of the contract documents shall be provided and incorporated at no additional cost to the Owner.

1.4 QUALITY ASSURANCE

A. Code Requirements: All work covered by this Section shall conform to the latest requirements of the following regulations:

1. C.C.R., Title 24, Part 5 (2022 CPC).
2. 2022 California Plumbing Code.
3. SMACNA Seismic Restraint Manual Guidelines for Mechanical Systems.
4. National Fire Protection Association.
5. California State Division of Industrial Safety.
6. County Health Department.
7. Any other legally constituted body-having jurisdiction thereof.
8. Plumbing fixtures and accessories provided in a toilet room or bathing room required to comply with CBC Section 11B-213.2 shall comply with CBC Section 11B-213.3.
9. Access plumbing fixtures shall comply with all of the requirements of CBC Division 6.
10. Heights and location of all fixtures shall be mounted according to CBC Sections 11B-602 through 11B-612.
11. Accessible fixture controls shall comply with CBC Sections 11B-605.4 for urinals.

B. Nothing in the specifications or drawings shall be construed to permit deviation from the requirements of governing codes unless approval for said deviation has been obtained from the legally constituted authorities having jurisdiction and from the Owner's representative.

1.5 DRAWINGS

A. Because of the small-scale drawings, it is not possible to indicate all offsets, fittings and accessories which may be required. The Contractor shall carefully investigate the conditions surrounding installation of his work, furnishing the necessary piping, fittings, valves, traps, and other devices which may be required to complete the installation.

B. The general arrangement indicated on the drawings shall be followed as closely as possible. Coordinate with the Architectural, Structural, Mechanical and Electrical Drawings and the work of other trades prior to installation of piping fixtures and equipment to verify adequate space available for installation of the work shown. In the event a field condition arises which makes it impossible to install the work as indicated, submit, in writing, the proposed departures to the Architect for his approval. Only when Architect's approval is given, in writing, shall Contractor proceed with installation of the work.

C. Special Note: Should the Contractor make changes in the installation differing from what is indicated on the contract drawings and not necessitated due to field conditions as indicated hereinabove, the Contractor shall be required to re-install the work to comply with what has been indicated on the contract drawings. Should it be impossible to re-install the work and the installation is in accordance with all governing authorities, the architect may permit the installation to remain. However, all costs incurred to revise the contract drawings by the engineer for resubmittal to the building department indicating the as-installed condition shall become the responsibility of the Contractor.

D. In case of a difference in the specifications or between the specifications and the drawings, the Contractor shall figure the most expensive alternate and after award of contract, shall secure direction from the Architect.

1.6 PERMITS, INSPECTIONS AND LICENSES

A. All permits, inspections and licenses required by the legally constituted authorities for installation of the work according to the plans and specifications shall be obtained and paid as a part of the work of this section.

1.7 EXAMINATION OF PREMISES

A. Before bidding on this work, Contractors shall make a careful examination of the premises and shall thoroughly familiarize themselves with the requirements of the contract. By the act of submitting a proposal for the work included in this contract, the Contractor shall be deemed to have made such study and examination, and that he is familiar with and accepts all conditions of the site.

1.8 PROTECTION

A. All work, equipment and materials shall be protected at all times. Contractor shall make good all damage caused either directly or indirectly by his own workmen. Contractor shall also protect his own work from damage. He shall close all pipe openings with caps or plugs during installation. He shall protect all his equipment and materials against dirt, water, chemical and mechanical injury. Upon completion, all work shall be thoroughly cleaned and delivered in a new condition.

B. Contractor shall be held responsible for all damage to equipment and materials until he has received written notice from the Architect or Engineer that his work has been accepted.

1.9 LOCATIONS

A. The locations of apparatus, piping and equipment indicated on the drawings are approximate. Piping and equipment shall be installed in such a manner as to avoid all obstruction, preserve headroom, and keep openings and passages clear. The locations of and mounting heights of all fixtures shall be coordinated with the architectural plans and room elevations.

B. Clearances and Openings: Contractor shall cooperate and coordinate his work with all other trades to avoid conflict and permit for a neat and orderly appearance of the entire installation. The Contractor shall, in advance of the work, furnish instructions to the General Contractor as to his requirements for equipment and material installation of any kind, whether or not specifically mentioned on drawings or in the specifications, and shall include recesses, chases in walls, and all required openings in the structure. Should furnishing this information be neglected, delayed or incorrect and additional cuttings are found to be required, the cost of the same shall be charged to this Contractor.

C. Contractor shall verify and coordinate pipe routing with location of all electrical rooms, elevator equipment rooms, telecom/data rooms, and other rooms dedicated to the housing of switchgear, panels, or other electrical equipment. In no case shall piping be installed within or above the ceiling of such rooms.

1.10 SUBMITTAL DATA

A. Submittal Requirements:

1. Furnish, all at one time, prior to any installation, within the time noted below, six (6) copies of valid submittal data on all fixtures, material, equipment and devices. Each submitted item shall be indexed and referenced to these specifications and to identification numbers on fixtures and equipment schedules.
2. Manufacturers' submittal literature and shop drawings are required on all items to ensure the latest and most complete manufacturer's data is available for review. Requirements of the submittals and Engineer's submittal notes are a part of the work of this Division except that Engineer's notes may not be used as a means of increasing the scope of work of this Division.
3. Submittals will be checked for general conformance with the design concept of the project but the review does not guarantee quantities shown and does not supersede requirements of this Division to properly install work.
4. To be valid, all submittals must:

    a. Be delivered to the Architect's office within thirty-five (35) days of award of the contract. Contractor shall make time allowance for Engineer's review, return of comments, if any, and resubmittal if required. Corrections or changes in submittals returned as inadequate or incomplete shall be accomplished within this time limit.
    b. Clearly indicate and label as such any items proposed as substitution for that specified or shown on plans.
    c. Include all pertinent construction, installation, performance and technical data.
    d. Have all product data sheets clearly labeled to indicate the individual items being submitted. In addition, all required options and accessories shall be clearly marked.

1) Product data sheets corresponding to items indicated on plans shall be clearly labeled with the corresponding fixture or equipment tag number.
2) Product data sheets corresponding to items indicated in specifications shall be clearly labeled with the specification section, page and item numbers.

e. Include, for every item which differs in size, configuration, connections, service, accessibility or any other significant way, a drawing to the same (or larger) scale as to the pertinent portions of the contract drawings. In this drawing show a complete layout of the system except that which is identical to the contract drawings, unless the unchanged portions must be shown to indicate such things as clearances. This drawing, together with the contract design drawings must show the complete system as revised to accommodate the proposed alternate.

B. Substitution Requirements:

1. Any items included in submittals and proposed by the Contractor as substitution for that specified or shown on plans shall be submitted within thirty five (35) days of award of the contract. After such time, proposed substitutions shall not be accepted for review, and the Contractor shall submit all items as specified or shown on plans.

a. For each item proposed as substitution for that specified or shown on plans, copies of product data sheets for the specified item shall be placed side by side with product data sheets for the proposed substitution item within the submittal.

1) In addition to the Submittal Requirements for labeling listed above, product data sheets for the specified item shall be clearly labeled “SPECIFIED ITEM, NOT SUBMITTED”. Product data sheets for the corresponding proposed substitution item shall be clearly labeled “PROPOSED SUBSTITUTION”.

b. Provide calculations and other detailed data justifying how any items proposed as substitution were selected for proposal. Data must be complete enough to permit detailed comparison of every significant characteristic for which the specified item was analyzed during design.

2. It shall be the Contractor’s responsibility to provide sufficient information to allow the Engineer to analyze any proposed alternate. If inadequate information is provided, the proposal will not be approved and resubmittal will not be allowed.
3. The Contractor shall provide or perform tests required by Engineer for purpose of judging acceptability of proposed substitutions.
4. The Contractor assumes full responsibility that alternate items and procedures will meet the job requirements and is responsible for cost of redesign and of modifications to this and other parts of work caused by alternate items furnished under work in this Section. In view of these responsibilities, it is the purpose of these specifications to establish procedures to ensure that the Contractor has considered all the ramifications of proposed alternates before submitting them for review. Submittals which do not comply with the requirements of these specifications or which indicate proposed alternates that were selected without proper regard to the requirements of the job will not be approved. No more than one proposed alternate will be considered for each item.
5. Alternate items installed without Engineer's approval will be replaced with specified items at Contractor's expense.
6. The Architect or his authorized representative shall be the sole judge as to the quality and suitability of proposed alternate equipment, fixtures or materials. Decisions of the Architect or that of his representative shall be final and conclusive.

1.11 MAINTENANCE MATERIAL SUBMITTALS

A. Furnish extra materials that are packaged with protective covering for storage and identified with labels describing contents.

1. Flushometer-Valve Repair Kits: Equal to 10 percent of amount of each type installed, but no fewer than six of each type.

1.12 UNINSPECTED WORK

A. The Contractor shall not allow or cause any of his work to be covered up or closed in until it has been inspected, tested, approved by all authorities have jurisdiction, and until Project Record drawings have been properly annotated.

B. Should any of his work be covered up or closed in before such inspection, he shall, at his own expense, uncover the work to the satisfaction of the inspection party. All related repair work cost shall be borne by the Contractor.

1.13 RECORD DRAWINGS

A. Contractor shall provide and keep up-to-date a complete "as-built" record set of blueline prints which shall show every change from the original drawings and the exact "as-built" locations and sizes of the work provided under this Section of the specifications. This set shall include locations, dimensions, depth of buried piping, cleanouts, shut-off valves, sewer invert locations, plugged wyes, tees, etc. On completion of the work, the Contractor shall incorporate all as-built information on a set of reproducible tracings provided by the Architect and this set of reproducibles shall be delivered to the Architect.

1.14 GUARANTEES (Also see General Conditions)

A. Contractor shall guarantee the entire plumbing and piping systems unconditionally for a period of one (1) year after final acceptance. If, during this period, any materials, equipment, or any part of the systems fail to function properly, the Contractor shall make good the defects promptly and without any expense to the Owner.

B. Contractor shall be responsible for all damage to any part of the premises caused by leaks in pipelines or equipment furnished and installed under this Section for a period of one (1) year after date of acceptance of his work.

C. All equipment and fixtures shall carry manufacturer's warranty against defective parts or poor workmanship for not less than one (1) year. See specific equipment specifications for extended warranty requirements.

PART 2 - PRODUCTS

2.1 EQUIPMENT AND FIXTURES:

A. Fixtures:
1. See schedule on drawings.

2.2 WALL-HUNG URINALS

A. Urinals: Floor mounted, back outlet, washout.

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
2. Basis-of-Design Product: Subject to compliance with requirements, provide product indicated on Drawings or comparable product by one of the following:

    a. American Standard
    b. Kohler Co.

3. Fixture:

    a. Standards: ASME A112.19.2/CSA B45.1 and ASME A112.19.5.
    b. Material: Vitreous china.
    c. Type: Washout.
    d. Strainer or Trapway: Manufacturer's standard strainer with integral trap.
    e. Water Consumption: Water saving.
    f. Spud Size and Location: NPS 3/4 (DN 20); top.
    g. Outlet Size and Location: NPS 2 (DN 50); back.
    h. Color: White.

4. Waste Fitting:

    a. Standard: ASME A112.18.2/CSA B125.2 for coupling.
    b. Size: NPS 2 (DN 50).

5. Support: ASME A112.6.1M, Type I, urinal carrier with fixture support plates and coupling with seal and fixture bolts and hardware matching fixture. Include rectangular, steel uprights.

    a. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
    b. Basis-of-Design Product: Subject to compliance with requirements, provide product indicated on Drawings or comparable product by one of the following:

        1) ZURN CARRIERS

2.3 URINAL FLUSHOMETER VALVES

A. Lever-Handle, Diaphragm Flushometer Valves:

1. Manufacturers: Subject to compliance with requirements, provide products by the following:
2. Basis-of-Design Product: Subject to compliance with requirements, provide product indicated on Drawings or comparable product by one of the following:

    a. Sloan Valve Company.

3. Standard: ASSE 1037.
4. Minimum Pressure Rating: 125 psig (860 kPa).
5. Features: Include integral check stop and backflow-prevention device.
6. Material: Brass body with corrosion-resistant components.

7. Exposed Flushometer-Valve Finish: Chrome plated.
8. Panel Finish: Chrome plated or stainless steel.
9. Style: Exposed.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Locations and Accessibility: Install equipment for ease of maintenance and repair. If changes in the indicated locations or arrangements are made by the Contractor, they shall be made without additional charges.

B. Openings: Furnish information to the other trades on size and location of openings which are required in walls, slabs, roof, for piping and equipment at the proper times.

C. Proceed with installation only after unsatisfactory conditions have been corrected.

D. Closing-In of Uninspected Work: Do not allow or cause any of the work to be covered up or enclosed until it has been inspected, tested, and approved by the Architect. Any work enclosed or covered prior to such inspection and test shall be uncovered and, after it has been inspected, tested, and approved, make all repairs with such materials as may be necessary to restore all work, including that of other trades, to its original and proper condition.

3.2 INSTALLATION

A. Urinal Installation:

1. Install urinals level and plumb according to roughing-in drawings.
2. Install wall-hung, back-outlet urinals onto waste fitting seals and attached to supports.
3. Install wall-hung, bottom-outlet urinals with tubular waste piping attached to supports.
4. Install accessible, wall-mounted urinals at mounting height for the handicapped/elderly, according to ICC/ANSI A117.1.

B. Support Installation:

1. Install supports, affixed to building substrate, for wall-hung urinals.
2. Use off-floor carriers with waste fitting and seal for back-outlet urinals.
3. Use carriers without waste fitting for urinals with tubular waste piping.
4. Use chair-type carrier supports with rectangular steel uprights for accessible urinals.

C. Flushometer-Valve Installation:

1. Install flushometer-valve water-supply fitting on each supply to each urinal.
2. Attach supply piping to supports or substrate within pipe spaces behind fixtures.
3. Install lever-handle flushometer valves for accessible urinals with handle mounted on open side of compartment.
4. Install fresh batteries in battery-powered, electronic-sensor mechanisms.

D. Wall Flange and Escutcheon Installation:

1. Install wall flanges or escutcheons at piping wall penetrations in exposed, finished locations.

2. Install deep-pattern escutcheons if required to conceal protruding fittings.
3. Comply with escutcheon requirements specified in Section 220518 "Escutcheons for Plumbing Piping."

E. Joint Sealing:

1. Seal joints between urinals and walls and floors using sanitary-type, one-part, mildew-resistant silicone sealant.
2. Match sealant color to urinal color.
3. Comply with sealant requirements specified in Section 079200 "Joint Sealants."

3.3 CONNECTIONS

A. Connect urinals with water supplies and soil, waste, and vent piping. Use size fittings required to match urinals.

B. Comply with water piping requirements specified in Section 221116 "Domestic Water Piping."

C. Comply with soil and waste piping requirements specified in Section 221316 "Sanitary Waste and Vent Piping."

D. Where installing piping adjacent to urinals, allow space for service and maintenance.

3.4 ADJUSTING

A. Operate and adjust urinals and controls. Replace damaged and malfunctioning urinals, fittings, and controls.

B. Adjust water pressure at flushometer valves to produce proper flow.

3.5 CLEANING AND PROTECTION

A. Clean urinals and fittings with manufacturers' recommended cleaning methods and materials.

B. Install protective covering for installed urinals and fittings.

C. Do not allow use of urinals for temporary facilities unless approved in writing by Owner.

3.6 COMPLETION OF INSTALLATION:

A. Cleaning and Flushing: Clean all equipment and materials thoroughly. Leave surface to be painted smooth and clean, ready for painting.

B. Flush each unit of water supply and distribution system thoroughly with clean water at the highest velocities attainable.

C. Clean all piping, valves, traps, water heaters, fixtures and other devices thoroughly and flush or blow out until free of scale, oil silt, sand, sediment, pipe dope and foreign matter of any kind.

3.7 PLUMBING FIXTURES

A. Accessible plumbing fixtures shall comply with all of the requirements of CBC Division 6.

B. Heights and location of all accessible fixtures shall be mounted according to CBC Sections 11B-602 through 11B-612.

C. Fixture controls shall comply with CBC Sections 11B-605.4 for urinals.

END OF SECTION 22 42 13 16

SECTION 22 42 16 13 - COMMERCIAL LAVATORIES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section Includes:

1. Lavatories.
2. Faucets.

1.3 WORK INCLUDED

A. Furnish all labor, materials, services, testing, transportation and equipment necessary for the completion of all plumbing work as indicated on drawings and specified herein. Work materials and equipment not indicated or specified which is necessary for the complete and proper operation of the work of this Section in accordance with the true intent and meaning of the contract documents shall be provided and incorporated at no additional cost to the Owner.

1.4 QUALITY ASSURANCE

A. Code Requirements: All work covered by this Section shall conform to the latest requirements of the following regulations:

1. C.C.R., Title 24, Part 5 (2022 CPC).
2. 2022 California Plumbing Code.
3. SMACNA Seismic Restraint Manual Guidelines for Mechanical Systems.
4. National Fire Protection Association.
5. California State Division of Industrial Safety.
6. County Health Department.
7. Any other legally constituted body-having jurisdiction thereof.
8. Plumbing fixtures and accessories provided in a toilet room or bathing room required to comply with CBC Section 11B-213.2 shall comply with CBC Section 11B-213.3.
9. Access plumbing fixtures shall comply with all of the requirements of CBC Division 6.
10. Heights and location of all fixtures shall be mounted according to CBC Sections 11B-602 through 11B-612.
11. Accessible fixture controls shall comply with CBC Sections 11B-611.3 for lavatories and sinks.
12. Accessible lavatories and sinks shall be mounted with the front of the higher of the rim or counter surface 34” maximum above the finish floor or ground. Depth of lavatories or sinks shall not interfere with knee an toe clearance provided in accordance with CBC 11B-306 when forward approach is required CBC Sections 11B-606.3 and 11B606.7.

13. Water supply and drain pipes under accessible lavatories and sinks shall be insulated or otherwise configured to protect against contact. There shall be no sharp or abrasive surfaces under accessible lavatories or sinks. CBC Section 11B-606.5.

B. Nothing in the specifications or drawings shall be construed to permit deviation from the requirements of governing codes unless approval for said deviation has been obtained from the legally constituted authorities having jurisdiction and from the Owner's representative.

1.5 DRAWINGS

A. Because of the small-scale drawings, it is not possible to indicate all offsets, fittings and accessories which may be required. The Contractor shall carefully investigate the conditions surrounding installation of his work, furnishing the necessary piping, fittings, valves, traps, and other devices which may be required to complete the installation.

B. The general arrangement indicated on the drawings shall be followed as closely as possible. Coordinate with the Architectural, Structural, Mechanical and Electrical Drawings and the work of other trades prior to installation of piping fixtures and equipment to verify adequate space available for installation of the work shown. In the event a field condition arises which makes it impossible to install the work as indicated, submit, in writing, the proposed departures to the Architect for his approval. Only when Architect's approval is given, in writing, shall Contractor proceed with installation of the work.

C. Special Note: Should the Contractor make changes in the installation differing from what is indicated on the contract drawings and not necessitated due to field conditions as indicated hereinabove, the Contractor shall be required to re-install the work to comply with what has been indicated on the contract drawings. Should it be impossible to re-install the work and the installation is in accordance with all governing authorities, the architect may permit the installation to remain. However, all costs incurred to revise the contract drawings by the engineer for resubmittal to the building department indicating the as-installed condition shall become the responsibility of the Contractor.

D. In case of a difference in the specifications or between the specifications and the drawings, the Contractor shall figure the most expensive alternate and after award of contract, shall secure direction from the Architect.

1.6 PERMITS, INSPECTIONS AND LICENSES

A. All permits, inspections and licenses required by the legally constituted authorities for installation of the work according to the plans and specifications shall be obtained and paid as a part of the work of this section.

1.7 EXAMINATION OF PREMISES

A. Before bidding on this work, Contractors shall make a careful examination of the premises and shall thoroughly familiarize themselves with the requirements of the contract. By the act of submitting a proposal for the work included in this contract, the Contractor shall be deemed to have made such study and examination, and that he is familiar with and accepts all conditions of the site.

1.8 PROTECTION

A. All work, equipment and materials shall be protected at all times. Contractor shall make good all damage caused either directly or indirectly by his own workmen. Contractor shall also protect his own work from damage. He shall close all pipe openings with caps or plugs during installation. He shall protect all his equipment and materials against dirt, water, chemical and mechanical injury. Upon completion, all work shall be thoroughly cleaned and delivered in a new condition.

B. Contractor shall be held responsible for all damage to equipment and materials until he has received written notice from the Architect or Engineer that his work has been accepted.

1.9 LOCATIONS

A. The locations of apparatus, piping and equipment indicated on the drawings are approximate. Piping and equipment shall be installed in such a manner as to avoid all obstruction, preserve headroom, and keep openings and passages clear. The locations of and mounting heights of all fixtures shall be coordinated with the architectural plans and room elevations.

B. Clearances and Openings: Contractor shall cooperate and coordinate his work with all other trades to avoid conflict and permit for a neat and orderly appearance of the entire installation. The Contractor shall, in advance of the work, furnish instructions to the General Contractor as to his requirements for equipment and material installation of any kind, whether or not specifically mentioned on drawings or in the specifications, and shall include recesses, chases in walls, and all required openings in the structure. Should furnishing this information be neglected, delayed or incorrect and additional cuttings are found to be required, the cost of the same shall be charged to this Contractor.

C. Contractor shall verify and coordinate pipe routing with location of all electrical rooms, elevator equipment rooms, telecom/data rooms, and other rooms dedicated to the housing of switchgear, panels, or other electrical equipment. In no case shall piping be installed within or above the ceiling of such rooms.

1.10 SUBMITTAL DATA

A. Submittal Requirements:

1. Furnish, all at one time, prior to any installation, within the time noted below, six (6) copies of valid submittal data on all fixtures, material, equipment and devices. Each submitted item shall be indexed and referenced to these specifications and to identification numbers on fixtures and equipment schedules.
2. Manufacturers' submittal literature and shop drawings are required on all items to ensure the latest and most complete manufacturer's data is available for review. Requirements of the submittals and Engineer's submittal notes are a part of the work of this Division except that Engineer's notes may not be used as a means of increasing the scope of work of this Division.
3. Submittals will be checked for general conformance with the design concept of the project but the review does not guarantee quantities shown and does not supersede requirements of this Division to properly install work.
4. To be valid, all submittals must:

    a. Be delivered to the Architect's office within thirty-five (35) days of award of the contract. Contractor shall make time allowance for Engineer's review, return of

comments, if any, and resubmittal if required. Corrections or changes in submittals returned as inadequate or incomplete shall be accomplished within this time limit.

b. Clearly indicate and label as such any items proposed as substitution for that specified or shown on plans.

c. Include all pertinent construction, installation, performance and technical data.

d. Have all product data sheets clearly labeled to indicate the individual items being submitted. In addition, all required options and accessories shall be clearly marked.

1) Product data sheets corresponding to items indicated on plans shall be clearly labeled with the corresponding fixture or equipment tag number.

2) Product data sheets corresponding to items indicated in specifications shall be clearly labeled with the specification section, page and item numbers.

e. Include, for every item which differs in size, configuration, connections, service, accessibility or any other significant way, a drawing to the same (or larger) scale as to the pertinent portions of the contract drawings. In this drawing show a complete layout of the system except that which is identical to the contract drawings, unless the unchanged portions must be shown to indicate such things as clearances. This drawing, together with the contract design drawings must show the complete system as revised to accommodate the proposed alternate.

B. Substitution Requirements:

1. Any items included in submittals and proposed by the Contractor as substitution for that specified or shown on plans shall be submitted within thirty five (35) days of award of the contract. After such time, proposed substitutions shall not be accepted for review, and the Contractor shall submit all items as specified or shown on plans.

a. For each item proposed as substitution for that specified or shown on plans, copies of product data sheets for the specified item shall be placed side by side with product data sheets for the proposed substitution item within the submittal.

1) In addition to the Submittal Requirements for labeling listed above, product data sheets for the specified item shall be clearly labeled “SPECIFIED ITEM, NOT SUBMITTED”. Product data sheets for the corresponding proposed substitution item shall be clearly labeled “PROPOSED SUBSTITUTION”.

b. Provide calculations and other detailed data justifying how any items proposed as substitution were selected for proposal. Data must be complete enough to permit detailed comparison of every significant characteristic for which the specified item was analyzed during design.

2. It shall be the Contractor’s responsibility to provide sufficient information to allow the Engineer to analyze any proposed alternate. If inadequate information is provided, the proposal will not be approved and resubmittal will not be allowed.

3. The Contractor shall provide or perform tests required by Engineer for purpose of judging acceptability of proposed substitutions.

4. The Contractor assumes full responsibility that alternate items and procedures will meet the job requirements and is responsible for cost of redesign and of modifications to this and other parts of work caused by alternate items furnished under work in this Section. In view of these responsibilities, it is the purpose of these specifications to establish procedures to ensure that the Contractor has considered all the ramifications of proposed alternates before submitting them for review. Submittals which do not comply with the requirements of these specifications or which indicate proposed alternates that were

selected without proper regard to the requirements of the job will not be approved. No more than one proposed alternate will be considered for each item.

5. Alternate items installed without Engineer's approval will be replaced with specified items at Contractor's expense.
6. The Architect or his authorized representative shall be the sole judge as to the quality and suitability of proposed alternate equipment, fixtures or materials. Decisions of the Architect or that of his representative shall be final and conclusive.

1.11 MAINTENANCE MATERIAL SUBMITTALS

A. Furnish extra materials that are packaged with protective covering for storage and identified with labels describing contents.

1.12 UNINSPECTED WORK

A. The Contractor shall not allow or cause any of his work to be covered up or closed in until it has been inspected, tested, approved by all authorities have jurisdiction, and until Project Record drawings have been properly annotated.

B. Should any of his work be covered up or closed in before such inspection, he shall, at his own expense, uncover the work to the satisfaction of the inspection party. All related repair work cost shall be borne by the Contractor.

1.13 RECORD DRAWINGS (Also see General Conditions)

A. Contractor shall provide and keep up-to-date a complete "as-built" record set of blueline prints which shall show every change from the original drawings and the exact "as-built" locations and sizes of the work provided under this Section of the specifications. This set shall include locations, dimensions, depth of buried piping, cleanouts, shut-off valves, sewer invert locations, plugged wyes, tees, etc. On completion of the work, the Contractor shall incorporate all as-built information on a set of reproducible tracings provided by the Architect and this set of reproducibles shall be delivered to the Architect.

1.14 GUARANTEES

A. Contractor shall guarantee the entire plumbing and piping systems unconditionally for a period of one (1) year after final acceptance. If, during this period, any materials, equipment, or any part of the systems fail to function properly, the Contractor shall make good the defects promptly and without any expense to the Owner.

B. Contractor shall be responsible for all damage to any part of the premises caused by leaks in pipelines or equipment furnished and installed under this Section for a period of one (1) year after date of acceptance of his work.

C. All equipment and fixtures shall carry manufacturer's warranty against defective parts or poor workmanship for not less than one (1) year. See specific equipment specifications for extended warranty requirements.

PART 2 - PRODUCTS

2.1 Equipment and Fixtures:

A. Fixtures:

1. See schedule on drawings.

2.2 VITREOUS-CHINA, WALL-MOUNTED LAVATORIES

A. Lavatory: Vitreous china, wall mounted, with back.

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

   a. American Standard America.
   b. Kohler Co.

2. Fixture:

   a. Standard: ASME A112.19.2/CSA B45.1.
   b. Type: For wall hanging.
   c. Faucet-Hole Location: Top.
   d. Color: White.
   e. Mounting Material: Chair carrier.

3. Support: ASME A112.6.1M, Type II, concealed-arm lavatory carrier.

2.3 VITREOUS-CHINA, UNDERCOUNTER-MOUNTED LAVATORIES

A. Lavatory: Vitreous china, under-counter mounted.

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
2. Basis-of-Design Product: Subject to compliance with requirements, provide product indicated on Drawings or comparable product by one of the following:

   a. American Standard America.
   b. Kohler Co.

3. Fixture:

   a. Standard: ASME A112.19.2/CSA B45.1.
   b. Type: For deck mounted.
   c. Faucet-Hole Location: Counter.
   d. Color: White.
   e. Mounting Material: Manufacturers recommended installation.

2.4 SOLID-BRASS, MANUALLY OPERATED FAUCETS

A. NSF Standard: Comply with NSF/ANSI 61, "Drinking Water System Components - Health Effects," for faucet materials that will be in contact with potable water.

B. Lavatory Faucets: Manual-type, single-control mixing, commercial, solid-brass valve.

1. Manufacturers: Subject to compliance with requirements, provide products by the following:
2. Basis-of-Design Product: Subject to compliance with requirements, provide product indicated on Drawings or comparable product by one of the following:

   a. Chicago Faucets.

3. Standard: ASME A112.18.1/CSA B125.1.
4. General: Include hot- and cold-water indicators; coordinate faucet inlets with supplies and fixture hole punchings; coordinate outlet with spout and fixture receptor.
5. Body Material: Commercial, solid brass.
6. Finish: Polished chrome plate.
7. Mounting Type: Deck, exposed.

2.5 SUPPLY FITTINGS

A. NSF Standard: Comply with NSF/ANSI 61, "Drinking Water System Components - Health Effects," for supply-fitting materials that will be in contact with potable water.

B. Standard: ASME A112.18.1/CSA B125.1.

C. Supply Piping: Chrome-plated-brass pipe or chrome-plated copper tube matching water-supply piping size. Include chrome-plated-brass or stainless-steel wall flange.

1. Manufacturers: Subject to compliance with requirements, provide products by the following:
2. Basis-of-Design Product: Subject to compliance with requirements, provide product indicated on Drawings or comparable product by one of the following:

   a. Chicago

D. Supply Stops: Chrome-plated-brass, one-quarter-turn, ball-type or compression valve with inlet connection matching supply piping.

1. Manufacturers: Subject to compliance with requirements, provide products by the following:
2. Basis-of-Design Product: Subject to compliance with requirements, provide product indicated on Drawings or comparable product by one of the following:

   a. Chicago

E. Operation: Loose key.

F. Risers:

1. NPS 3/8.
2. Chrome-plated, rigid-copper-pipe and brass straight or offset tailpieces riser.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Locations and Accessibility: Install equipment for ease of maintenance and repair. If changes in the indicated locations or arrangements are made by the Contractor, they shall be made without additional charges.

B. Openings: Furnish information to the other trades on size and location of openings which are required in walls, slabs, roof, for piping and equipment at the proper times.

C. Proceed with installation only after unsatisfactory conditions have been corrected.

D. Closing-In of Uninspected Work: Do not allow or cause any of the work to be covered up or enclosed until it has been inspected, tested, and approved by the Architect. Any work enclosed or covered prior to such inspection and test shall be uncovered and, after it has been inspected, tested, and approved, make all repairs with such materials as may be necessary to restore all work, including that of other trades, to its original and proper condition.

3.2 INSTALLATION

A. Install lavatories level and plumb according to roughing-in drawings.

B. Install supports, affixed to building substrate, for wall-mounted lavatories.

C. Install accessible wall-mounted lavatories at handicapped/elderly mounting height for people with disabilities or the elderly, according to ICC/ANSI A117.1.

D. Install wall flanges or escutcheons at piping wall penetrations in exposed, finished locations. Use deep-pattern escutcheons if required to conceal protruding fittings. Comply with escutcheon requirements specified in Section 220518 "Escutcheons for Plumbing Piping."

E. Seal joints between lavatories, counters, and walls using sanitary-type, one-part, mildew-resistant silicone sealant. Match sealant color to fixture color. Comply with sealant requirements specified in Section 079200 "Joint Sealants."

F. Install protective shielding pipe covers and enclosures on exposed supplies and waste piping of accessible lavatories. Comply with requirements in Section 220719 "Plumbing Piping Insulation."

G. Point of use mixing valve in cabinet to be recessed in wall, under lavatory.

3.3 CONNECTIONS

A. Connect fixtures with water supplies, stops, and risers, and with traps, soil, waste, and vent piping. Use size fittings required to match fixtures.

B. Comply with water piping requirements specified in Section 221116 "Domestic Water Piping."

C. Comply with soil and waste piping requirements specified in Section 221316 "Sanitary Waste and Vent Piping."

3.4 ADJUSTING

A. Operate and adjust lavatories and controls. Replace damaged and malfunctioning lavatories, fittings, and controls.

B. Adjust water pressure at faucets to produce proper flow.

3.5 CLEANING AND PROTECTION

A. After completing installation of lavatories, inspect and repair damaged finishes.

B. Clean lavatories, faucets, and other fittings with manufacturers' recommended cleaning methods and materials.

C. Provide protective covering for installed lavatories and fittings.

D. Do not allow use of lavatories for temporary facilities unless approved in writing by Owner.

3.6 PLUMBING FIXTURES

A. Accessible plumbing fixtures shall comply with all of the requirements of CBC Division 6.

B. Heights and location of all accessible fixtures shall be mounted according to CBC Sections 11B-602 through 11B-612.

C. Fixture controls shall comply with CBC Sections 11B-606.4 for lavatories and sinks.

D. Accessible sinks shall be 6-1/2” deep maximum. Sinks shall be mounted with front of the higher of the rim and counter surface 34” maximum above the finish floor or ground.

E. Water supply and drain pipes under lavatories and sinks shall be insulated or otherwise configured to protect against contact. There shall be no sharp or abrasive surfaces under lavatories and sinks. CBC Section 11B-606.

END OF SECTION 22 42 16 13

SECTION 22 42 16 16 - COMMERCIAL SINKS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section Includes:

1. Classroom Sinks
2. Sinks
3. Service sinks.
4. Sink faucets.

1.3 WORK INCLUDED

A. Furnish all labor, materials, services, testing, transportation and equipment necessary for the completion of all plumbing work as indicated on drawings and specified herein. Work materials and equipment not indicated or specified which is necessary for the complete and proper operation of the work of this Section in accordance with the true intent and meaning of the contract documents shall be provided and incorporated at no additional cost to the Owner.

1.4 QUALITY ASSURANCE

A. Code Requirements: All work covered by this Section shall conform to the latest requirements of the following regulations:

1. C.C.R., Title 24, Part 5 (2022 CPC).
2. 2022 California Plumbing Code.
3. SMACNA Seismic Restraint Manual Guidelines for Mechanical Systems.
4. National Fire Protection Association.
5. California State Division of Industrial Safety.
6. County Health Department.
7. Any other legally constituted body-having jurisdiction thereof.
8. Access plumbing fixtures shall comply with all of the requirements of CBC Division 6.
9. Heights and location of all fixtures shall be mounted according to CBC Sections 11B-602 through 11B-612.
10. Accessible fixture controls shall comply with CBC Sections 11B-611.3 for lavatories and sinks.
11. Accessible lavatories and sinks shall be mounted with the front of the higher of the rim or counter surface 34” maximum above the finish floor or ground. Depth of lavatories or sinks shall not interfere with knee an toe clearance provided in accordance with CBC 11B-306 when forward approach is required CBC Sections 11B-606.3 and 11B606.7.
12. Water supply and drain pipes under accessible lavatories and sinks shall be insulated or otherwise configured to protect against contact. There shall be no sharp or abrasive surfaces under accessible lavatories or sinks. CBC Section 11B-606.5.

B. Nothing in the specifications or drawings shall be construed to permit deviation from the requirements of governing codes unless approval for said deviation has been obtained from the legally constituted authorities having jurisdiction and from the Owner's representative.

1.5 DRAWINGS

A. Because of the small-scale drawings, it is not possible to indicate all offsets, fittings and accessories which may be required. The Contractor shall carefully investigate the conditions surrounding installation of his work, furnishing the necessary piping, fittings, valves, traps, and other devices which may be required to complete the installation.

B. The general arrangement indicated on the drawings shall be followed as closely as possible. Coordinate with the Architectural, Structural, Mechanical and Electrical Drawings and the work of other trades prior to installation of piping fixtures and equipment to verify adequate space available for installation of the work shown. In the event a field condition arises which makes it impossible to install the work as indicated, submit, in writing, the proposed departures to the Architect for his approval. Only when Architect's approval is given, in writing, shall Contractor proceed with installation of the work.

C. Special Note: Should the Contractor make changes in the installation differing from what is indicated on the contract drawings and not necessitated due to field conditions as indicated hereinabove, the Contractor shall be required to re-install the work to comply with what has been indicated on the contract drawings. Should it be impossible to re-install the work and the installation is in accordance with all governing authorities, the architect may permit the installation to remain. However, all costs incurred to revise the contract drawings by the engineer for resubmittal to the building department indicating the as-installed condition shall become the responsibility of the Contractor.

D. In case of a difference in the specifications or between the specifications and the drawings, the Contractor shall figure the most expensive alternate and after award of contract, shall secure direction from the Architect.

1.6 PERMITS, INSPECTIONS AND LICENSES

A. All permits, inspections and licenses required by the legally constituted authorities for installation of the work according to the plans and specifications shall be obtained and paid as a part of the work of this section.

1.7 EXAMINATION OF PREMISES

A. Before bidding on this work, Contractors shall make a careful examination of the premises and shall thoroughly familiarize themselves with the requirements of the contract. By the act of submitting a proposal for the work included in this contract, the Contractor shall be deemed to have made such study and examination, and that he is familiar with and accepts all conditions of the site.

1.8 PROTECTION

A. All work, equipment and materials shall be protected at all times. Contractor shall make good all damage caused either directly or indirectly by his own workmen. Contractor shall also protect his own work from damage. He shall close all pipe openings with caps or plugs during

installation. He shall protect all his equipment and materials against dirt, water, chemical and mechanical injury. Upon completion, all work shall be thoroughly cleaned and delivered in a new condition.

B. Contractor shall be held responsible for all damage to equipment and materials until he has received written notice from the Architect or Engineer that his work has been accepted.

1.9 LOCATIONS

A. The locations of apparatus, piping and equipment indicated on the drawings are approximate. Piping and equipment shall be installed in such a manner as to avoid all obstruction, preserve headroom, and keep openings and passages clear. The locations of and mounting heights of all fixtures shall be coordinated with the architectural plans and room elevations.

B. Clearances and Openings: Contractor shall cooperate and coordinate his work with all other trades to avoid conflict and permit for a neat and orderly appearance of the entire installation. The Contractor shall, in advance of the work, furnish instructions to the General Contractor as to his requirements for equipment and material installation of any kind, whether or not specifically mentioned on drawings or in the specifications, and shall include recesses, chases in walls, and all required openings in the structure. Should furnishing this information be neglected, delayed or incorrect and additional cuttings are found to be required, the cost of the same shall be charged to this Contractor.

C. Contractor shall verify and coordinate pipe routing with location of all electrical rooms, elevator equipment rooms, telecom/data rooms, and other rooms dedicated to the housing of switchgear, panels, or other electrical equipment. In no case shall piping be installed within or above the ceiling of such rooms.

1.10 SUBMITTAL DATA

A. Submittal Requirements:

1. Furnish, all at one time, prior to any installation, within the time noted below, six (6) copies of valid submittal data on all fixtures, material, equipment and devices. Each submitted item shall be indexed and referenced to these specifications and to identification numbers on fixtures and equipment schedules.
2. Manufacturers' submittal literature and shop drawings are required on all items to ensure the latest and most complete manufacturer's data is available for review. Requirements of the submittals and Engineer's submittal notes are a part of the work of this Division except that Engineer's notes may not be used as a means of increasing the scope of work of this Division.
3. Submittals will be checked for general conformance with the design concept of the project but the review does not guarantee quantities shown and does not supersede requirements of this Division to properly install work.
4. To be valid, all submittals must:

    a. Be delivered to the Architect's office within thirty-five (35) days of award of the contract. Contractor shall make time allowance for Engineer's review, return of comments, if any, and resubmittal if required. Corrections or changes in submittals returned as inadequate or incomplete shall be accomplished within this time limit.
    b. Clearly indicate and label as such any items proposed as substitution for that specified or shown on plans.
    c. Include all pertinent construction, installation, performance and technical data.

d. Have all product data sheets clearly labeled to indicate the individual items being submitted. In addition, all required options and accessories shall be clearly marked.

1) Product data sheets corresponding to items indicated on plans shall be clearly labeled with the corresponding fixture or equipment tag number.
2) Product data sheets corresponding to items indicated in specifications shall be clearly labeled with the specification section, page and item numbers.

e. Include, for every item which differs in size, configuration, connections, service, accessibility or any other significant way, a drawing to the same (or larger) scale as to the pertinent portions of the contract drawings. In this drawing show a complete layout of the system except that which is identical to the contract drawings, unless the unchanged portions must be shown to indicate such things as clearances. This drawing, together with the contract design drawings must show the complete system as revised to accommodate the proposed alternate.

B. Substitution Requirements:

1. Any items included in submittals and proposed by the Contractor as substitution for that specified or shown on plans shall be submitted within thirty five (35) days of award of the contract. After such time, proposed substitutions shall not be accepted for review, and the Contractor shall submit all items as specified or shown on plans.

a. For each item proposed as substitution for that specified or shown on plans, copies of product data sheets for the specified item shall be placed side by side with product data sheets for the proposed substitution item within the submittal.

1) In addition to the Submittal Requirements for labeling listed above, product data sheets for the specified item shall be clearly labeled “SPECIFIED ITEM, NOT SUBMITTED”. Product data sheets for the corresponding proposed substitution item shall be clearly labeled “PROPOSED SUBSTITUTION”.

b. Provide calculations and other detailed data justifying how any items proposed as substitution were selected for proposal. Data must be complete enough to permit detailed comparison of every significant characteristic for which the specified item was analyzed during design.

2. It shall be the Contractor’s responsibility to provide sufficient information to allow the Engineer to analyze any proposed alternate. If inadequate information is provided, the proposal will not be approved and resubmittal will not be allowed.
3. The Contractor shall provide or perform tests required by Engineer for purpose of judging acceptability of proposed substitutions.
4. The Contractor assumes full responsibility that alternate items and procedures will meet the job requirements and is responsible for cost of redesign and of modifications to this and other parts of work caused by alternate items furnished under work in this Section. In view of these responsibilities, it is the purpose of these specifications to establish procedures to ensure that the Contractor has considered all the ramifications of proposed alternates before submitting them for review. Submittals which do not comply with the requirements of these specifications or which indicate proposed alternates that were selected without proper regard to the requirements of the job will not be approved. No more than one proposed alternate will be considered for each item.
5. Alternate items installed without Engineer's approval will be replaced with specified items at Contractor's expense.

6. The Architect or his authorized representative shall be the sole judge as to the quality and suitability of proposed alternate equipment, fixtures or materials. Decisions of the Architect or that of his representative shall be final and conclusive.

1.11 MAINTENANCE MATERIAL SUBMITTALS

A. Furnish extra materials that are packaged with protective covering for storage and identified with labels describing contents.

1.12 UNINSPECTED WORK

A. The Contractor shall not allow or cause any of his work to be covered up or closed in until it has been inspected, tested, approved by all authorities have jurisdiction, and until Project Record drawings have been properly annotated.

B. Should any of his work be covered up or closed in before such inspection, he shall, at his own expense, uncover the work to the satisfaction of the inspection party. All related repair work cost shall be borne by the Contractor.

1.13 RECORD DRAWINGS

A. Contractor shall provide and keep up-to-date a complete "as-built" record set of blueline prints which shall show every change from the original drawings and the exact "as-built" locations and sizes of the work provided under this Section of the specifications. This set shall include locations, dimensions, depth of buried piping, cleanouts, shut-off valves, sewer invert locations, plugged wyes, tees, etc. On completion of the work, the Contractor shall incorporate all as-built information on a set of reproducible tracings provided by the Architect and this set of reproducibles shall be delivered to the Architect.

1.14 GUARANTEES

A. Contractor shall guarantee the entire plumbing and piping systems unconditionally for a period of one (1) year after final acceptance. If, during this period, any materials, equipment, or any part of the systems fail to function properly, the Contractor shall make good the defects promptly and without any expense to the Owner.

B. Contractor shall be responsible for all damage to any part of the premises caused by leaks in pipelines or equipment furnished and installed under this Section for a period of one (1) year after date of acceptance of his work.

C. All equipment and fixtures shall carry manufacturer's warranty against defective parts or poor workmanship for not less than one (1) year. See specific equipment specifications for extended warranty requirements.

PART 2 - PRODUCTS

2.1 Equipment and Fixtures:

A. Fixtures:

1. See schedule on drawings.

2.2 SINKS

A. Utility Sinks: Stainless steel, counter mounted.

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
2. Basis-of-Design Product: Subject to compliance with requirements, provide product indicated on Drawings or comparable product by one of the following:

    a. Elkay Manufacturing Co.
    b. Just Manufacturing.

3. Fixture:

    a. Standard: ASME A112.19.3/CSA B45.4.
    b. Type: Ledge back.
    c. Number of Compartments: One
    d. Overall Dimensions: 22 by 19 inches
    e. Metal Thickness: 0.050 inch
    f. Compartment:

        1) Dimensions: See Plumbing Fixture Schedule
        2) Drain: Grid with NPS 1-1/2 tailpiece with stopper
        3) Drain Location: Centered in compartment.

4. Faucet(s): See Plumbing Fixture Schedule

    a. Number Required: One.
    b. Mounting: On ledge.

2.3 VITREOUS-CHINA, WALL-MOUNTED HAND SINKS

A. Lavatory: Vitreous china, wall mounted, with back.

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
2. Basis-of-Design Product: Subject to compliance with requirements, provide product indicated on Drawings or comparable product by one of the following:

    a. American Standard America.
    b. Kohler Co.

3. Fixture:

    a. Standard: ASME A112.19.2/CSA B45.1.
    b. Type: For wall hanging.
    c. Faucet-Hole Location: Top.
    d. Color: White.
    e. Mounting Material: Chair carrier.

4. Support: ASME A112.6.1M, Type II, concealed-arm lavatory carrier.

2.4 SERVICE SINKS

A. Service Sinks: Enameled, cast iron, wall mounted.

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
2. Basis-of-Design Product: Subject to compliance with requirements, provide product indicated on Drawings or comparable product by one of the following:

   a. Commercial Enameling Company (CECO).
   b. American Standard America.
   c. Kohler Co.

3. Fixture:

   a. Standard: ASME A112.19.1/CSA B45.2.
   b. Style: With front apron and raised back.
   c. Nominal Size: 28 by 28 inches.
   d. Color: White.
   e. Drain: Grid with NPS 3 outlet.
   f. Rim Guard: Coated wire.

2.5 SINK FAUCETS

A. NSF Standard: Comply with NSF/ANSI 61, "Drinking Water System Components - Health Effects," for faucet-spout materials that will be in contact with potable water.

B. Sink Faucets: Manual Type, Push Button.

1. Commercial, Solid-Brass Faucets.

   a. Manufacturers: Subject to compliance with requirements, provide products by the following:
   b. Basis-of-Design Product: Subject to compliance with requirements, provide product indicated on Drawings or comparable product by one of the following

      1) Chicago Faucets.

2. Standard: ASME A112.18.1/CSA B125.1.
3. General: Include hot- and cold-water indicators; coordinate faucet inlets with supplies and fixture hole punchings; coordinate outlet with spout and sink receptor.
4. Body Material: Commercial, solid brass.
5. Finish: Chrome plated.
6. Maximum Flow Rate:

   a. Sinks: 1.8 gpm.
   b. Service Sinks: - gpm

7. Mounting Type: Back/wall, exposed.
8. Vacuum Breaker: Required for hose outlet.
9. Spout Outlet: Hose thread according to ASME B1.20.7.

2.6 SUPPLY FITTINGS

A. NSF Standard: Comply with NSF/ANSI 61, "Drinking Water System Components - Health Effects," for supply-fitting materials that will be in contact with potable water.

B. Standard: ASME A112.18.1/CSA B125.1.

C. Supply Piping: Chrome-plated brass pipe or chrome-plated copper tube matching water-supply piping size. Include chrome-plated brass or stainless-steel wall flange.

1. Manufacturers: Subject to compliance with requirements, provide products by the following:
2. Basis-of-Design Product: Subject to compliance with requirements, provide product indicated on Drawings or comparable product by one of the following:

   a. Chicago

D. Supply Stops: Chrome-plated brass, one-quarter-turn, ball-type or compression valve with inlet connection matching supply piping.

1. Manufacturers: Subject to compliance with requirements, provide products by the following:
2. Basis-of-Design Product: Subject to compliance with requirements, provide product indicated on Drawings or comparable product by one of the following:

   a. Chicago

E. Operation: Loose Key.

2.7 SINK WASTE FITTINGS

A. Standard: ASME A112.18.2/CSA B125.2.

B. Drain: Grid type with NPS 1-1/2 offset and straight tailpiece.

C. Trap:

1. Manufacturers: Subject to compliance with requirements, provide products by the following:
2. Basis-of-Design Product: Subject to compliance with requirements, provide product indicated on Drawings or comparable product by one of the following:

   a. McGuire MFG.

3. Size: NPS 1-1/2.
4. Material: Chrome-plated, seamless prewrapped cast-brass trap and swivel elbow, and chrome-plated brass or steel wall flange.

2.8 SERVICE SINK WASTE FITTINGS

A. Standard: ASME A112.18.2/CSA B125.2.

B. Drain: Grid type with NPS 3 offset and straight tailpiece.

C. Trap:

1. Size: NPS 3.
2. Material: Flat Chrome strainer, cast-brass trap and swivel elbow.

2.9 GROUT

A. Standard: ASTM C 1107/C 1107M, Grade B, post-hardening and volume-adjusting, dry, hydraulic-cement grout.

B. Characteristics: Nonshrink; recommended for interior and exterior applications.

C. Design Mix: 5000-psi, 28-day compressive strength.

D. Packaging: Premixed and factory packaged.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Locations and Accessibility: Install equipment for ease of maintenance and repair. If changes in the indicated locations or arrangements are made by the Contractor, they shall be made without additional charges.

B. Openings: Furnish information to the other trades on size and location of openings which are required in walls, slabs, roof, for piping and equipment at the proper times.

C. Proceed with installation only after unsatisfactory conditions have been corrected.

D. Closing-In of Uninspected Work: Do not allow or cause any of the work to be covered up or enclosed until it has been inspected, tested, and approved by the Architect. Any work enclosed or covered prior to such inspection and test shall be uncovered and, after it has been inspected, tested, and approved, make all repairs with such materials as may be necessary to restore all work, including that of other trades, to its original and proper condition.

3.2 INSTALLATION

A. Install sinks level and plumb according to roughing-in drawings.

B. Install supports, affixed to building substrate, for wall-hung sinks.

C. Install accessible wall-mounted sinks at handicapped/elderly mounting height according to ICC/ANSI A117.1.

D. Set floor-mounted sinks in leveling bed of cement grout.

E. Install water-supply piping with stop on each supply to each sink faucet.

1. Exception: Use ball, gate, or globe valves if supply stops are not specified with sink. Comply with valve requirements specified in Section 220523 "General-Duty Valves for Plumbing Piping."

2. Install stops in locations where they can be easily reached for operation.

F. Install wall flanges or escutcheons at piping wall penetrations in exposed, finished locations. Use deep-pattern escutcheons if required to conceal protruding fittings. Comply with escutcheon requirements specified in Section 220518 "Escutcheons for Plumbing Piping."

G. Seal joints between sinks and counters, floors, and walls using sanitary-type, one-part, mildew-resistant silicone sealant. Match sealant color to fixture color. Comply with sealant requirements specified in Section 079200 "Joint Sealants."

H. Install protective shielding pipe covers and enclosures on exposed supplies and waste piping of accessible sinks. Comply with requirements in Section 220719 "Plumbing Piping Insulation."

3.3 CONNECTIONS

A. Connect sinks with water supplies, stops, and risers, and with traps, soil, waste, and vent piping. Use size fittings required to match fixtures.

B. Comply with water piping requirements specified in Section 221116 "Domestic Water Piping."

C. Comply with soil and waste piping requirements specified in Section 221316 "Sanitary Waste and Vent Piping."

3.4 ADJUSTING

A. Operate and adjust sinks and controls. Replace damaged and malfunctioning sinks, fittings, and controls.

B. Adjust water pressure at faucets to produce proper flow.

3.5 CLEANING AND PROTECTION

A. After completing installation of sinks, inspect and repair damaged finishes.

B. Clean sinks, faucets, and other fittings with manufacturers' recommended cleaning methods and materials.

C. Provide protective covering for installed sinks and fittings.

D. Do not allow use of sinks for temporary facilities unless approved in writing by Owner.

3.6 COMPLETION OF INSTALLATION:

A. Cleaning and Flushing: Clean all equipment and materials thoroughly. Leave surface to be painted smooth and clean, ready for painting.

B. Flush each unit of water supply and distribution system thoroughly with clean water at the highest velocities attainable.

C. Clean all piping, valves, traps, water heaters, fixtures and other devices thoroughly and flush or blow out until free of scale, oil silt, sand, sediment, pipe dope and foreign matter of any kind.

3.7 PLUMBING FIXTURES

A. Accessible plumbing fixtures shall comply with all of the requirements of CBC Division 6.

B. Heights and location of all accessible fixtures shall be mounted according to CBC Sections 11B-602 through 11B-612.

C. Fixture controls shall comply with CBC Sections 11B-606.4 for lavatories and sinks.

D. Accessible sinks shall be 6-1/2” deep maximum. Sinks shall be mounted with front of the higher of the rim and counter surface 34” maximum above the finish floor or ground.

E. Water supply and drain pipes under lavatories and sinks shall be insulated or otherwise configured to protect against contact. There shall be no sharp or abrasive surfaces under lavatories and sinks. CBC Section 11B-606.

END OF SECTION 22 42 16 16

SECTION 22 42 23 - COMMERCIAL SHOWERS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section Includes:

1. Individual shower receptors.
2. Shower faucets.
3. Group showers.
4. Grout.

B. Related Requirements:

1. Section 224100 "Residential Plumbing Fixtures" for residential showers.
2. Section 224300 "Medical Plumbing Fixtures" for healthcare showers.
3. Section 224500 "Emergency Plumbing Fixtures" for emergency showers.
4. Section 224600 "Security Plumbing Fixtures" for security showers.

1.1 WORK INCLUDED

A. Furnish all labor, materials, services, testing, transportation and equipment necessary for the completion of all plumbing work as indicated on drawings and specified herein. Work materials and equipment not indicated or specified which is necessary for the complete and proper operation of the work of this Section in accordance with the true intent and meaning of the contract documents shall be provided and incorporated at no additional cost to the Owner.

1.2 QUALITY ASSURANCE

A. Code Requirements: All work covered by this Section shall conform to the latest requirements of the following regulations:

1. C.C.R., Title 24, Part 5 (2022 CPC).
2. 2229 California Plumbing Code.
3. SMACNA Seismic Restraint Manual Guidelines for Mechanical Systems.
4. National Fire Protection Association.
5. California State Division of Industrial Safety.
6. County Health Department.
7. Any other legally constituted body-having jurisdiction thereof.
8. Plumbing fixtures and accessories provided in a toilet room or bathing room required to comply with CBC Section 11B-213.2 shall comply with CBC Section 11B-213.3.
9. Access plumbing fixtures shall comply with all of the requirements of CBC Division 6.

10. Heights and location of all fixtures shall be mounted according to CBC Sections 11B-602 through 11B-612.
11. Accessible fixture controls shall comply with CBC Sections 11B-608.5 for showers.

B. Nothing in the specifications or drawings shall be construed to permit deviation from the requirements of governing codes unless approval for said deviation has been obtained from the legally constituted authorities having jurisdiction and from the Owner's representative.

1.1 DRAWINGS

A. Because of the small-scale drawings, it is not possible to indicate all offsets, fittings and accessories which may be required. The Contractor shall carefully investigate the conditions surrounding installation of his work, furnishing the necessary piping, fittings, valves, traps, and other devices which may be required to complete the installation.

B. The general arrangement indicated on the drawings shall be followed as closely as possible. Coordinate with the Architectural, Structural, Mechanical and Electrical Drawings and the work of other trades prior to installation of piping fixtures and equipment to verify adequate space available for installation of the work shown. In the event a field condition arises which makes it impossible to install the work as indicated, submit, in writing, the proposed departures to the Architect for his approval. Only when Architect's approval is given, in writing, shall Contractor proceed with installation of the work.

C. Special Note: Should the Contractor make changes in the installation differing from what is indicated on the contract drawings and not necessitated due to field conditions as indicated hereinabove, the Contractor shall be required to re-install the work to comply with what has been indicated on the contract drawings. Should it be impossible to re-install the work and the installation is in accordance with all governing authorities, the architect may permit the installation to remain. However, all costs incurred to revise the contract drawings by the engineer for resubmittal to the building department indicating the as-installed condition shall become the responsibility of the Contractor.

D. In case of a difference in the specifications or between the specifications and the drawings, the Contractor shall figure the most expensive alternate and after award of contract, shall secure direction from the Architect.

1.2 PERMITS, INSPECTIONS AND LICENSES

A. All permits, inspections and licenses required by the legally constituted authorities for installation of the work according to the plans and specifications shall be obtained and paid as a part of the work of this section.

1.1 EXAMINATION OF PREMISES

A. Before bidding on this work, Contractors shall make a careful examination of the premises and shall thoroughly familiarize themselves with the requirements of the contract. By the act of submitting a proposal for the work included in this contract, the Contractor shall be deemed to have made such study and examination, and that he is familiar with and accepts all conditions of the site.

1.2 PROTECTION

A. All work, equipment and materials shall be protected at all times. Contractor shall make good all damage caused either directly or indirectly by his own workmen. Contractor shall also protect his own work from damage. He shall close all pipe openings with caps or plugs during installation. He shall protect all his equipment and materials against dirt, water, chemical and mechanical injury. Upon completion, all work shall be thoroughly cleaned and delivered in a new condition.

B. Contractor shall be held responsible for all damage to equipment and materials until he has received written notice from the Architect or Engineer that his work has been accepted.

1.3 LOCATIONS

A. The locations of apparatus, piping and equipment indicated on the drawings are approximate. Piping and equipment shall be installed in such a manner as to avoid all obstruction, preserve headroom, and keep openings and passages clear. The locations of and mounting heights of all fixtures shall be coordinated with the architectural plans and room elevations.

B. Clearances and Openings: Contractor shall cooperate and coordinate his work with all other trades to avoid conflict and permit for a neat and orderly appearance of the entire installation. The Contractor shall, in advance of the work, furnish instructions to the General Contractor as to his requirements for equipment and material installation of any kind, whether or not specifically mentioned on drawings or in the specifications, and shall include recesses, chases in walls, and all required openings in the structure. Should furnishing this information be neglected, delayed or incorrect and additional cuttings are found to be required, the cost of the same shall be charged to this Contractor.

C. Contractor shall verify and coordinate pipe routing with location of all electrical rooms, elevator equipment rooms, telecom/data rooms, and other rooms dedicated to the housing of switchgear, panels, or other electrical equipment. In no case shall piping be installed within or above the ceiling of such rooms.

1.4 SUBMITTAL DATA

A. Product Data: For each type of product.

1. Include construction details, material descriptions, dimensions of individual components and profiles, and finishes for showers.
2. Include rated capacities, operating characteristics, and furnished specialties and accessories.

B. Submittal Requirements:

1. Furnish, all at one time, prior to any installation, within the time noted below, six (6) copies of valid submittal data on all fixtures, material, equipment and devices. Each submitted item shall be indexed and referenced to these specifications and to identification numbers on fixtures and equipment schedules.
2. Manufacturers' submittal literature and shop drawings are required on all items to ensure the latest and most complete manufacturer's data is available for review. Requirements of the submittals and Engineer's submittal notes are a part of the work of this Division except that Engineer's notes may not be used as a means of increasing the scope of work of this Division.

3. Submittals will be checked for general conformance with the design concept of the project but the review does not guarantee quantities shown and does not supersede requirements of this Division to properly install work.
4. To be valid, all submittals must:

    a. Be delivered to the Architect's office within thirty-five (35) days of award of the contract. Contractor shall make time allowance for Engineer's review, return of comments, if any, and resubmittal if required. Corrections or changes in submittals returned as inadequate or incomplete shall be accomplished within this time limit.
    b. Clearly indicate and label as such any items proposed as substitution for that specified or shown on plans.
    c. Include all pertinent construction, installation, performance and technical data.
    d. Have all product data sheets clearly labeled to indicate the individual items being submitted. In addition, all required options and accessories shall be clearly marked.

        1) Product data sheets corresponding to items indicated on plans shall be clearly labeled with the corresponding fixture or equipment tag number.
        2) Product data sheets corresponding to items indicated in specifications shall be clearly labeled with the specification section, page and item numbers.

    e. Include, for every item which differs in size, configuration, connections, service, accessibility or any other significant way, a drawing to the same (or larger) scale as to the pertinent portions of the contract drawings. In this drawing show a complete layout of the system except that which is identical to the contract drawings, unless the unchanged portions must be shown to indicate such things as clearances. This drawing, together with the contract design drawings must show the complete system as revised to accommodate the proposed alternate.

C. Substitution Requirements:

1. Any items included in submittals and proposed by the Contractor as substitution for that specified or shown on plans shall be submitted within thirty five (35) days of award of the contract. After such time, proposed substitutions shall not be accepted for review, and the Contractor shall submit all items as specified or shown on plans.

    a. For each item proposed as substitution for that specified or shown on plans, copies of product data sheets for the specified item shall be placed side by side with product data sheets for the proposed substitution item within the submittal.

        1) In addition to the Submittal Requirements for labeling listed above, product data sheets for the specified item shall be clearly labeled "SPECIFIED ITEM, NOT SUBMITTED". Product data sheets for the corresponding proposed substitution item shall be clearly labeled "PROPOSED SUBSTITUTION".

    b. Provide calculations and other detailed data justifying how any items proposed as substitution were selected for proposal. Data must be complete enough to permit detailed comparison of every significant characteristic for which the specified item was analyzed during design.

2. It shall be the Contractor's responsibility to provide sufficient information to allow the Engineer to analyze any proposed alternate. If inadequate information is provided, the proposal will not be approved and resubmittal will not be allowed.

3. The Contractor shall provide or perform tests required by Engineer for purpose of judging acceptability of proposed substitutions.
4. The Contractor assumes full responsibility that alternate items and procedures will meet the job requirements and is responsible for cost of redesign and of modifications to this and other parts of work caused by alternate items furnished under work in this Section. In view of these responsibilities, it is the purpose of these specifications to establish procedures to ensure that the Contractor has considered all the ramifications of proposed alternates before submitting them for review. Submittals which do not comply with the requirements of these specifications or which indicate proposed alternates that were selected without proper regard to the requirements of the job will not be approved. No more than one proposed alternate will be considered for each item.

5. Alternate items installed without Engineer's approval will be replaced with specified items at Contractor's expense.

1.5 CLOSEOUT SUBMITTALS

A. Maintenance Data: For shower faucets to include in maintenance manuals.

1.6 MAINTENANCE MATERIAL SUBMITTALS

A. Furnish extra materials that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.

1. Faucet Washers and O-Rings: Equal to 10 percent of amount of each type and size installed.
2. Faucet Cartridges and O-Rings: Equal to 5 percent of amount of each type and size installed.

1.7 QUALITY ASSURANCE

A. Piping materials shall bear label, stamp, or other markings of specified testing agency.

B. Comply with NSF/ANSI 14, "Plastics Piping System Components and Related Materials," for plastic piping components. Include marking with "NSF-drain" for plastic drain piping and "NSF-sewer" for plastic sewer piping.

1.8 PROJECT CONDITIONS

A. Interruption of Existing Storm-Drainage Service: Do not interrupt service to facilities occupied by Owner or others unless permitted under the following conditions and then only after arranging to provide temporary service according to requirements indicated:

1. Notify Architect no fewer than two days in advance of proposed interruption of storm-drainage service.
2. Do not proceed with interruption of storm-drainage service without Architect's written permission.

PART 2 - PRODUCTS

2.1 SHOWER FAUCETS

A. NSF Standard: Comply with NSF 61, "Drinking Water System Components - Health Effects," for shower materials that will be in contact with potable water.

B. Shower Faucets Faculty:

1. Manufacturers: Subject to compliance with requirements, provide products by the following:
2. Basis-of-Design Product: Subject to compliance with requirements, provide product indicated on Drawings or comparable product by one of the following:

    a. Symmons
    b. Bradley
    c. Acorn Engineering Company

3. Description: Single-handle, pressure-balance mixing valve with hot- and cold-water indicators; check stops; and shower head.
4. Faucet:

    a. Standards: ASME A112.18.1/CSA B125.1 and ASSE 1016.
    b. Body Material: Solid brass.
    c. Finish: Polished chrome plate.
    d. Maximum Flow Rate: 1.5 gpm.
    e. Mounting: Exposed.
    f. Operation: Single-handle control.
    g. Antiscald Device: Integral with mixing valve.
    h. Check Stops: Check-valve type, integral with or attached to body; on hot- and cold-water supply connections.

5. Supply Connections: NPS 1/2.
6. Shower Head:

    a. Standard: ASME A112.18.1/CSA B125.1.
    b. Type: Hand shower with five foot stainless steel hose.
    c. Shower Head Material: Metallic with chrome-plated finish.
    d. Spray Pattern: Fixed.
    e. Integral Volume Control: Required.
    f. Shower-Arm, Flow-Control Fitting: 1.5 gpm.
    g. Temperature Indicator: Not required.

2.2 GROUT

A. Standard: ASTM C 1107/C 1107M, Grade B, post-hardening and volume-adjusting, dry, hydraulic-cement grout.

B. Characteristics: Nonshrink; recommended for interior and exterior applications.

C. Design Mix: 5000-psi, 28-day compressive strength.

D. Packaging: Premixed and factory packaged.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine roughing-in of water-supply and sanitary drainage and vent piping systems to verify actual locations of piping connections before shower installation.

B. Examine walls and floors for suitable conditions where showers will be installed.

C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION

A. Assemble shower components according to manufacturers' written instructions.

B. Install showers level and plumb according to roughing-in drawings.

C. Install water-supply piping with stop on each supply to each shower faucet.

1. Exception: Use ball, gate, or globe valves if supply stops are not specified with shower. Comply with valve requirements specified in Section 220523 "General-Duty Valves for Plumbing Piping."
2. Install stops in locations where they can be easily reached for operation.

D. Install shower flow-control fittings with specified maximum flow rates in shower arms.

E. Set shower receptors in leveling bed of cement grout.

F. Install wall flanges or escutcheons at piping wall penetrations in exposed, finished locations. Use deep-pattern escutcheons if required to conceal protruding fittings. Comply with escutcheons requirements specified in Section 220518 "Escutcheons for Plumbing Piping."

G. Seal joints between showers and floors and walls using sanitary-type, one-part, mildew-resistant silicone sealant. Match sealant color to fixture color. Comply with sealant requirements specified in Section 079200 "Joint Sealants."

3.3 COMPLETION OF INSTALLATION:

A. Cleaning and Flushing: Clean all equipment and materials thoroughly. Leave surface to be painted smooth and clean, ready for painting.

B. Flush each unit of water supply and distribution system thoroughly with clean water at the highest velocities attainable.

C. Clean all piping, valves, traps, water heaters, fixtures and other devices thoroughly and flush or blow out until free of scale, oil silt, sand, sediment, pipe dope and foreign matter of any kind.

3.4 CONNECTIONS

A. Connect fixtures with water supplies, stops, and risers, and with traps, soil, waste, and vent piping. Use size fittings required to match fixtures.

B. Comply with water piping requirements specified in Section 221116 "Domestic Water Piping."

C. Comply with traps and soil and waste piping requirements specified in Section 221316 "Sanitary Waste and Vent Piping."

3.5 ADJUSTING

A. Operate and adjust showers and controls. Replace damaged and malfunctioning showers, fittings, and controls.

B. Adjust water pressure at faucets to produce proper flow.

3.6 CLEANING AND PROTECTION

A. After completing installation of showers, inspect and repair damaged finishes.

B. Clean showers, faucets, and other fittings with manufacturers' recommended cleaning methods and materials.

C. Provide protective covering for installed fixtures and fittings.

D. Do not allow use of showers for temporary facilities unless approved in writing by Owner.

3.7 OPERATION INSTRUCTION

A. Prior to occupancy or prior to the date of final inspection, whichever may occur first, the Contractor shall prepare two (2) sets of typewritten instructions for the operation of all equipment, valves, etc., specified and furnished as a part of the work under this section, and shall assign a competent person, thoroughly familiar with the job, to demonstrate and instruct a representative of the Owner in the operation of the equipment. The time of said demonstration and instructions shall be arranged with the Owner's representative approximately one (1) week in advance. Verbal instructions shall include shut-off location of gas and water. The Contractor shall assemble all operation and maintenance data supplied by the manufacturers of the various pieces of equipment, all keys and special wrenches required to operate and service the equipment (including keys for yard boxes, gas stops and fixture stops), and all equipment warranties and deliver same to the representative of the Owner on date of said instructions.

END OF SECTION 22 42 23

SECTION 23 05 00 - COMMON WORK RESULTS FOR HVAC

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. This Section includes the following:

1. Mechanical sleeve seals.
2. Sleeves.
3. Escutcheons.
4. Grout.
5. Equipment installation requirements common to equipment sections.
6. Painting and finishing.
7. Concrete bases.
8. Supports and anchorages.

1.3 DEFINITIONS

A. Finished Spaces: Spaces other than mechanical and electrical equipment rooms, furred spaces, pipe and duct chases, unheated spaces immediately below roof, spaces above ceilings, unexcavated spaces, crawlspaces, and tunnels.

B. Exposed, Interior Installations: Exposed to view indoors. Examples include finished occupied spaces and mechanical equipment rooms.

C. Exposed, Exterior Installations: Exposed to view outdoors or subject to outdoor ambient temperatures and weather conditions. Examples include rooftop locations.

D. Concealed, Interior Installations: Concealed from view and protected from physical contact by building occupants. Examples include above ceilings and chases.

E. Concealed, Exterior Installations: Concealed from view and protected from weather conditions and physical contact by building occupants but subject to outdoor ambient temperatures. Examples include installations within unheated shelters.

F. The following are industry abbreviations for plastic materials:

1. CPVC: Chlorinated polyvinyl chloride plastic.
2. PE: Polyethylene plastic.
3. PVC: Polyvinyl chloride plastic.

G. The following are industry abbreviations for rubber materials:

1. EPDM: Ethylene-propylene-diene terpolymer rubber.
2. NBR: Acrylonitrile-butadiene rubber.

1.4 SUBMITTALS

A. Product Data: For the following:

1. Mechanical sleeve seals.
2. Escutcheons.

B. Welding certificates.

1.5 QUALITY ASSURANCE

A. Steel Support Welding: Qualify processes and operators according to AWS D1.1, "Structural Welding Code--Steel."

B. Steel Pipe Welding: Qualify processes and operators according to ASME Boiler and Pressure Vessel Code: Section IX, "Welding and Brazing Qualifications."

1. Comply with provisions in ASME B31 Series, "Code for Pressure Piping."
2. Certify that each welder has passed AWS qualification tests for welding processes involved and that certification is current.

C. Electrical Characteristics for HVAC Equipment: Equipment of higher electrical characteristics may be furnished provided such proposed equipment is approved in writing and connecting electrical services, circuit breakers, and conduit sizes are appropriately modified. If minimum energy ratings or efficiencies are specified, equipment shall comply with requirements.

1.6 DELIVERY, STORAGE, AND HANDLING

A. Deliver pipes and tubes with factory-applied end caps. Maintain end caps through shipping, storage, and handling to prevent pipe end damage and to prevent entrance of dirt, debris, and moisture.

B. Store plastic pipes protected from direct sunlight. Support to prevent sagging and bending.

1.7 COORDINATION

A. Arrange for pipe spaces, chases, slots, and openings in building structure during progress of construction, to allow for HVAC installations.

B. Coordinate installation of required supporting devices and set sleeves in poured-in-place concrete and other structural components as they are constructed.

C. Coordinate requirements for access panels and doors for HVAC items requiring access that are concealed behind finished surfaces. Access panels and doors are specified in Division 08 Section "Access Doors and Frames."

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. In other Part 2 articles where subparagraph titles below introduce lists, the following requirements apply for product selection:

1. Manufacturers: Subject to compliance with requirements, provide products by one of the manufacturers specified.

2.2 PIPE, TUBE, AND FITTINGS

A. Refer to individual Division 23 piping Sections for pipe, tube, and fitting materials and joining methods.

B. Pipe Threads: ASME B1.20.1 for factory-threaded pipe and pipe fittings.

2.3 JOINING MATERIALS

A. Refer to individual Division 23 piping Sections for special joining materials not listed below.

B. Pipe-Flange Gasket Materials: Suitable for chemical and thermal conditions of piping system contents.

1. ASME B16.21, nonmetallic, flat, asbestos-free, 1/8-inch maximum thickness unless thickness or specific material is indicated.

   a. Full-Face Type: For flat-face, Class 125, cast-iron and cast-bronze flanges.
   b. Narrow-Face Type: For raised-face, Class 250, cast-iron and steel flanges.

2. AWWA C110, rubber, flat face, 1/8 inch thick, unless otherwise indicated; and full-face or ring type, unless otherwise indicated.

C. Flange Bolts and Nuts: ASME B18.2.1, carbon steel, unless otherwise indicated.

D. Plastic, Pipe-Flange Gasket, Bolts, and Nuts: Type and material recommended by piping system manufacturer, unless otherwise indicated.

E. Solder Filler Metals: ASTM B 32, lead-free alloys. Include water-flushable flux according to ASTM B 813.

F. Brazing Filler Metals: AWS A5.8, BCuP Series, copper-phosphorus alloys for general-duty brazing, unless otherwise indicated; and AWS A5.8, BAg1, silver alloy for refrigerant piping, unless otherwise indicated.

G. Welding Filler Metals: Comply with AWS D10.12 for welding materials appropriate for wall thickness and chemical analysis of steel pipe being welded.

2.4 MECHANICAL SLEEVE SEALS

A. Description: Modular sealing element unit, designed for field assembly, to fill annular space between pipe and sleeve.

1. Manufacturers:

   a. Advance Products & Systems, Inc.
   b. Calpico, Inc.
   c. Metraflex Co.
   d. Pipeline Seal and Insulator, Inc.

2. Sealing Elements: EPDM interlocking links shaped to fit surface of pipe. Include type and number required for pipe material and size of pipe.
3. Pressure Plates: Plastic. Include two for each sealing element.
4. Connecting Bolts and Nuts: Carbon steel with corrosion-resistant coating of length required to secure pressure plates to sealing elements. Include one for each sealing element.

2.5 SLEEVES

A. Galvanized-Steel Sheet: 0.0239-inch minimum thickness; round tube closed with welded longitudinal joint.

B. Steel Pipe: ASTM A 53, Type E, Grade B, Schedule 40, galvanized, plain ends.

C. Cast Iron: Cast or fabricated "wall pipe" equivalent to ductile-iron pressure pipe, with plain ends and integral waterstop, unless otherwise indicated.

D. Stack Sleeve Fittings: Manufactured, cast-iron sleeve with integral clamping flange. Include clamping ring and bolts and nuts for membrane flashing.

1. Underdeck Clamp: Clamping ring with set screws.

2.6 ESCUTCHEONS

A. Description: Manufactured wall and ceiling escutcheons and floor plates, with an ID to closely fit around pipe, tube, and insulation of insulated piping and an OD that completely covers opening.

B. One-Piece, Cast-Brass Type: With set screw.

1. Finish: Polished chrome-plated.

C. One-Piece, Floor-Plate Type: Cast-iron floor plate.

2.7 GROUT

A. Description: ASTM C 1107, Grade B, nonshrink and nonmetallic, dry hydraulic-cement grout.

1. Characteristics: Post-hardening, volume-adjusting, nonstaining, noncorrosive, nongaseous, and recommended for interior and exterior applications.
2. Design Mix: 5000-psi, 28-day compressive strength.
3. Packaging: Premixed and factory packaged.

PART 3 - EXECUTION

3.1 PIPING SYSTEMS - COMMON REQUIREMENTS

A. Install piping according to the following requirements and Division 23 Sections specifying piping systems.

B. Drawing plans, schematics, and diagrams indicate general location and arrangement of piping systems. Indicated locations and arrangements were used to size pipe and calculate friction loss, expansion, pump sizing, and other design considerations. Install piping as indicated unless deviations to layout are approved on Coordination Drawings.

C. Install piping in concealed locations, unless otherwise indicated and except in equipment rooms and service areas.

D. Install piping indicated to be exposed and piping in equipment rooms and service areas at right angles or parallel to building walls. Diagonal runs are prohibited unless specifically indicated otherwise.

E. Install piping above accessible ceilings to allow sufficient space for ceiling panel removal.

F. Install piping to permit valve servicing.

G. Install piping at indicated slopes.

H. Install piping free of sags and bends.

I. Install fittings for changes in direction and branch connections.

J. Install piping to allow application of insulation.

K. Select system components with pressure rating equal to or greater than system operating pressure.

L. Install escutcheons for penetrations of walls, ceilings, and floors according to the following:

1. New Piping:

a. Piping with Fitting or Sleeve Protruding from Wall: One-piece, deep-pattern type.
b. Chrome-Plated Piping: One-piece, cast-brass type with polished chrome-plated finish.
c. Insulated Piping: One-piece, stamped-steel type with spring clips.
d. Bare Piping at Wall and Floor Penetrations in Finished Spaces: One-piece, cast-brass type with polished chrome-plated finish.
e. Bare Piping at Wall and Floor Penetrations in Finished Spaces: One-piece, stamped-steel type.

f. Bare Piping at Ceiling Penetrations in Finished Spaces: One-piece cast-brass type with polished chrome-plated finish.
g. Bare Piping in Unfinished Service Spaces: One-piece, cast-brass type with polished chrome-plated finish.
h. Bare Piping in Equipment Rooms: One-piece, cast-brass type.
i. Bare Piping at Floor Penetrations in Equipment Rooms: One-piece, floor-plate type.

M. Sleeves are not required for core-drilled holes.

N. Permanent sleeves are not required for holes formed by removable PE sleeves.

O. Install sleeves for pipes passing through concrete and masonry walls and concrete floor and roof slabs.

P. Install sleeves for pipes passing through concrete and masonry walls, gypsum-board partitions, and concrete floor and roof slabs.

1. Cut sleeves to length for mounting flush with both surfaces.

a. Exception: Extend sleeves installed in floors of mechanical equipment areas or other wet areas 2 inches above finished floor level. Extend cast-iron sleeve fittings below floor slab as required to secure clamping ring if ring is specified.

2. Install sleeves in new walls and slabs as new walls and slabs are constructed.
3. Install sleeves that are large enough to provide 1/4-inch annular clear space between sleeve and pipe or pipe insulation. Use the following sleeve materials:

a. Steel Pipe Sleeves: For pipes smaller than NPS 6.
b. Steel Sheet Sleeves: For pipes NPS 6 and larger, penetrating gypsum-board partitions.
c. Stack Sleeve Fittings: For pipes penetrating floors with membrane waterproofing. Secure flashing between clamping flanges. Install section of cast-iron soil pipe to extend sleeve to 2 inches above finished floor level. Refer to Division 07 Section "Sheet Metal Flashing and Trim" for flashing.

1) Seal space outside of sleeve fittings with grout.

4. Except for underground wall penetrations, seal annular space between sleeve and pipe or pipe insulation, using joint sealants appropriate for size, depth, and location of joint. Refer to Division 07 Section "Joint Sealants" for materials and installation.

Q. Aboveground, Exterior-Wall Pipe Penetrations: Seal penetrations using sleeves and mechanical sleeve seals. Select sleeve size to allow for 1-inch annular clear space between pipe and sleeve for installing mechanical sleeve seals.

1. Install steel pipe for sleeves smaller than 6 inches in diameter.
2. Install cast-iron "wall pipes" for sleeves 6 inches and larger in diameter.
3. Mechanical Sleeve Seal Installation: Select type and number of sealing elements required for pipe material and size. Position pipe in center of sleeve. Assemble mechanical sleeve seals and install in annular space between pipe and sleeve. Tighten bolts against pressure plates that cause sealing elements to expand and make watertight seal.

R. Underground, Exterior-Wall Pipe Penetrations: Install cast-iron "wall pipes" for sleeves. Seal pipe penetrations using mechanical sleeve seals. Select sleeve size to allow for 1-inch annular clear space between pipe and sleeve for installing mechanical sleeve seals.

1. Mechanical Sleeve Seal Installation: Select type and number of sealing elements required for pipe material and size. Position pipe in center of sleeve. Assemble mechanical sleeve seals and install in annular space between pipe and sleeve. Tighten bolts against pressure plates that cause sealing elements to expand and make watertight seal.

S. Fire-Barrier Penetrations: Maintain indicated fire rating of walls, partitions, ceilings, and floors at pipe penetrations. Seal pipe penetrations with firestop materials. Refer to Division 07 Section "Penetration Firestopping" for materials.

T. Verify final equipment locations for roughing-in.

U. Refer to equipment specifications in other Sections of these Specifications for roughing-in requirements.

3.2 PIPING JOINT CONSTRUCTION

A. Join pipe and fittings according to the following requirements and Division 23 Sections specifying piping systems.

B. Ream ends of pipes and tubes and remove burrs. Bevel plain ends of steel pipe.

C. Remove scale, slag, dirt, and debris from inside and outside of pipe and fittings before assembly.

D. Soldered Joints: Apply ASTM B 813, water-flushable flux, unless otherwise indicated, to tube end. Construct joints according to ASTM B 828 or CDA's "Copper Tube Handbook," using lead-free solder alloy complying with ASTM B 32.

E. Brazed Joints: Construct joints according to AWS's "Brazing Handbook," "Pipe and Tube" Chapter, using copper-phosphorus brazing filler metal complying with AWS A5.8.

F. Threaded Joints: Thread pipe with tapered pipe threads according to ASME B1.20.1. Cut threads full and clean using sharp dies. Ream threaded pipe ends to remove burrs and restore full ID. Join pipe fittings and valves as follows:

1. Apply appropriate tape or thread compound to external pipe threads unless dry seal threading is specified.
2. Damaged Threads: Do not use pipe or pipe fittings with threads that are corroded or damaged. Do not use pipe sections that have cracked or open welds.

G. Welded Joints: Construct joints according to AWS D10.12, using qualified processes and welding operators according to Part 1 "Quality Assurance" Article.

H. Flanged Joints: Select appropriate gasket material, size, type, and thickness for service application. Install gasket concentrically positioned. Use suitable lubricants on bolt threads.

3.3 PIPING CONNECTIONS

A. Make connections according to the following, unless otherwise indicated:

1. Install unions, in piping NPS 2 and smaller, adjacent to each valve and at final connection to each piece of equipment.
2. Install flanges, in piping NPS 2-1/2 and larger, adjacent to flanged valves and at final connection to each piece of equipment.
3. Dry Piping Systems: Install dielectric unions and flanges to connect piping materials of dissimilar metals.
4. Wet Piping Systems: Install dielectric coupling and nipple fittings to connect piping materials of dissimilar metals.

3.4 EQUIPMENT INSTALLATION - COMMON REQUIREMENTS

A. Install equipment to allow maximum possible headroom unless specific mounting heights are not indicated.

B. Install equipment level and plumb, parallel and perpendicular to other building systems and components in exposed interior spaces, unless otherwise indicated.

C. Install HVAC equipment to facilitate service, maintenance, and repair or replacement of components. Connect equipment for ease of disconnecting, with minimum interference to other installations. Extend grease fittings to accessible locations.

D. Install equipment to allow right of way for piping installed at required slope.

3.5 PAINTING

A. Painting of HVAC systems, equipment, and components is specified in Division 09 Sections "Interior Painting" and "Exterior Painting."

B. Damage and Touchup: Repair marred and damaged factory-painted finishes with materials and procedures to match original factory finish.

3.6 CONCRETE BASES

A. Concrete Bases: Anchor equipment to concrete base according to equipment manufacturer's written instructions and according to seismic codes at Project.

1. Construct concrete bases of dimensions indicated, but not less than 4 inches larger in both directions than supported unit.
2. Install dowel rods to connect concrete base to concrete floor. Unless otherwise indicated, install dowel rods on 18-inch centers around the full perimeter of the base.
3. Install epoxy-coated anchor bolts for supported equipment that extend through concrete base, and anchor into structural concrete floor.
4. Place and secure anchorage devices. Use supported equipment manufacturer's setting drawings, templates, diagrams, instructions, and directions furnished with items to be embedded.
5. Install anchor bolts to elevations required for proper attachment to supported equipment.
6. Install anchor bolts according to anchor-bolt manufacturer's written instructions.

7. Use 3000-psi, 28-day compressive-strength concrete and reinforcement as specified in Division 03 Section "Cast-in-Place Concrete."

3.7 ERECTION OF METAL SUPPORTS AND ANCHORAGES

A. Refer to Division 05 Section "Metal Fabrications" for structural steel.

B. Cut, fit, and place miscellaneous metal supports accurately in location, alignment, and elevation to support and anchor HVAC materials and equipment.

C. Field Welding: Comply with AWS D1.1.

3.8 ERECTION OF WOOD SUPPORTS AND ANCHORAGES

A. Cut, fit, and place wood grounds, nailers, blocking, and anchorages to support, and anchor HVAC materials and equipment.

B. Select fastener sizes that will not penetrate members if opposite side will be exposed to view or will receive finish materials. Tighten connections between members. Install fasteners without splitting wood members.

C. Attach to substrates as required to support applied loads.

3.9 GROUTING

A. Mix and install grout for HVAC equipment base bearing surfaces, pump and other equipment base plates, and anchors.

B. Clean surfaces that will come into contact with grout.

C. Provide forms as required for placement of grout.

D. Avoid air entrapment during placement of grout.

E. Place grout, completely filling equipment bases.

F. Place grout on concrete bases and provide smooth bearing surface for equipment.

G. Place grout around anchors.

H. Cure placed grout.

END OF SECTION 230500

SECTION 23 05 16 - EXPANSION FITTINGS AND LOOPS FOR HVAC PIPING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section Includes:

1. Expansion-compensator packless expansion joints.
2. Flexible-hose packless expansion joints.
3. Grooved-joint expansion joints.
4. Pipe loops and swing connections.
5. Alignment guides and anchors.

1.3 PERFORMANCE REQUIREMENTS

A. Compatibility: Products shall be suitable for piping service fluids, materials, working pressures, and temperatures.

B. Capability: Products to absorb 200 percent of maximum axial movement between anchors.

1.4 ACTION SUBMITTALS

A. Product Data: For each type of product indicated.

B. Delegated-Design Submittal: For each anchor and alignment guide indicated to comply with performance requirements and design criteria, including analysis data signed and sealed by the qualified professional engineer responsible for their preparation.

1. Design Calculations: Calculate requirements for thermal expansion of piping systems and for selecting and designing expansion joints, loops, and swing connections.
2. Anchor Details: Detail fabrication of each anchor indicated. Show dimensions and methods of assembly and attachment to building structure.
3. Alignment Guide Details: Detail field assembly and attachment to building structure.
4. Schedule: Indicate type, manufacturer's number, size, material, pressure rating, end connections, and location for each expansion joint.

1.5 INFORMATIONAL SUBMITTALS

A. Welding certificates.

B. Product Certificates: For each type of expansion joint, from manufacturer.

1.6 CLOSEOUT SUBMITTALS

A. Maintenance Data: For expansion joints to include in maintenance manuals.

1.7 QUALITY ASSURANCE

A. Welding Qualifications: Qualify procedures and personnel according to the following:

1. AWS D1.1/D1.1M, "Structural Welding Code - Steel."
2. ASME Boiler and Pressure Vessel Code: Section IX.

PART 2 - PRODUCTS

2.1 PACKLESS EXPANSION JOINTS

A. Rubber, Expansion-Compensator Packless Expansion Joints:

1. Manufacturers: Subject to compliance with requirements, :provide products by one of the following:

   a. Mason Industries, Inc.
   b. Metraflex Company (The).
   c. Flex-Hose Co., Inc.

2. Material: Twin reinforced-rubber spheres with external restraining cables.
3. Minimum Pressure Rating: 225 psig at 170 deg F unless otherwise indicated.
4. End Connections for NPS 2 and Smaller: Threaded.

B. Flexible-Hose Packless Expansion Joints:

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

   a. Flex-Hose Co., Inc.
   b. Mason Industries, Inc.
   c. Metraflex Company (The).
   d. Unisource Manufacturing, Inc.

2. Description: Manufactured assembly with inlet and outlet elbow fittings and two flexible-metal-hose legs joined by long-radius, 180-degree return bend or center section of flexible hose.
3. Flexible Hose: Corrugated-metal inner hoses and braided outer sheaths.
4. Expansion Joints for Copper Tubing NPS 2 and Smaller: Copper-alloy fittings with solder-joint end connections.

   a. Bronze hoses and single-braid bronze sheaths with 450 psig at 70 deg F and 340 psig at 450 deg F ratings.

5. Expansion Joints for Copper Tubing NPS 2-1/2 to NPS 4: Copper-alloy fittings with solder-joint end connections.

a. Stainless-steel hoses and single-braid, stainless-steel sheaths with 300 psig at 70 deg F and 225 psig at 450 deg F ratings.

2.2 GROOVED-JOINT EXPANSION JOINTS

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1. Anvil International, Inc.
2. Shurjoint Piping Products.
3. Victaulic Company.

B. Description: Factory-assembled expansion joint made of several grooved-end pipe nipples, couplings, and grooved joints.

C. Standard: AWWA C606, for grooved joints.

D. Nipples: Galvanized, ASTM A 53/A 53M, Schedule 40, Type E or S, steel pipe with grooved ends.

E. Couplings: Seven, flexible type for steel-pipe dimensions. Include ferrous housing sections, EPDM gasket suitable for cold and hot water, and bolts and nuts.

2.3 ALIGNMENT GUIDES AND ANCHORS

A. Alignment Guides:

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

   a. Flex-Hose Co., Inc.
   b. Mason Industries, Inc.
   c. Metraflex Company (The).

2. Description: Steel, factory-fabricated alignment guide, with bolted two-section outer cylinder and base for attaching to structure; with two-section guiding spider for bolting to pipe.

B. Anchor Materials:

1. Steel Shapes and Plates: ASTM A 36/A 36M.
2. Bolts and Nuts: ASME B18.10 or ASTM A 183, steel hex head.
3. Washers: ASTM F 844, steel, plain, flat washers.
4. Mechanical Fasteners: Insert-wedge-type stud with expansion plug anchor for use in hardened portland cement concrete, with tension and shear capacities appropriate for application.

   a. Stud: Threaded, zinc-coated carbon steel.
   b. Expansion Plug: Zinc-coated steel.
   c. Washer and Nut: Zinc-coated steel.

PART 3 - EXECUTION

3.1 EXPANSION-JOINT INSTALLATION

A. Install expansion joints of sizes matching sizes of piping in which they are installed.

B. Install rubber packless expansion joints according to FSA-NMEJ-702.

C. Install grooved-joint expansion joints to grooved-end steel piping

3.2 PIPE LOOP AND SWING CONNECTION INSTALLATION

A. Install pipe loops cold-sprung in tension or compression as required to partly absorb tension or compression produced during anticipated change in temperature.

B. Connect risers and branch connections to mains with at least five pipe fittings including tee in main.

C. Connect risers and branch connections to terminal units with at least four pipe fittings including tee in riser.

D. Connect mains and branch connections to terminal units with at least four pipe fittings including tee in main.

3.3 ALIGNMENT-GUIDE AND ANCHOR INSTALLATION

A. Install alignment guides to guide expansion and to avoid end-loading and torsional stress.

B. Install one guide on each side of pipe expansion fittings and loops. Install guides nearest to expansion joint not more than four pipe diameters from expansion joint.

C. Attach guides to pipe and secure guides to building structure.

D. Install anchors at locations to prevent stresses from exceeding those permitted by ASME B31.9 and to prevent transfer of loading and stresses to connected equipment.

E. Anchor Attachments:

1. Anchor Attachment to Steel Pipe: Attach by welding. Comply with ASME B31.9 and ASME Boiler and Pressure Vessel Code: Section IX, "Welding and Brazing Qualifications."
2. Anchor Attachment to Copper Tubing: Attach with pipe hangers. Use MSS SP-69, Type 24, U-bolts bolted to anchor.

F. Fabricate and install steel anchors by welding steel shapes, plates, and bars. Comply with ASME B31.9 and AWS D1.1/D1.1M.

1. Anchor Attachment to Steel Structural Members: Attach by welding.
2. Anchor Attachment to Concrete Structural Members: Attach by fasteners. Follow fastener manufacturer's written instructions.

G. Use grout to form flat bearing surfaces for guides and anchors attached to concrete.

END OF SECTION 230516

SECTION 23 05 19 - METERS AND GAGES FOR HVAC PIPING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section Includes:

1. Filled-system thermometers.
2. Thermowells.
3. Dial-type pressure gages.
4. Gage attachments.
5. Test plugs.
6. Test-plug kits.
7. Sight flow indicators.

1.3 ACTION SUBMITTALS

A. Product Data: For each type of product indicated.

B. Wiring Diagrams: For power, signal, and control wiring.

1.4 INFORMATIONAL SUBMITTALS

A. Product Certificates: For each type of meter and gage, from manufacturer.

1.5 CLOSEOUT SUBMITTALS

A. Operation and Maintenance Data: For meters and gages to include in operation and maintenance manuals.

PART 2 - PRODUCTS

2.1 FILLED-SYSTEM THERMOMETERS

A. Direct-Mounted, Metal-Case, Vapor-Actuated Thermometers:

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

   a. Ashcroft Inc.

b. Marsh Bellofram.
c. Miljoco Corporation.
d. Palmer Wahl Instrumentation Group.
e. REOTEMP Instrument Corporation.
f. Trerice, H. O. Co.
g. Weiss Instruments, Inc.

2. Standard: ASME B40.200.
3. Case: Sealed type, cast aluminum or drawn steel; 4-1/2-inch diameter.
4. Element: Bourdon tube or other type of pressure element.
5. Movement: Mechanical, with link to pressure element and connection to pointer.
6. Dial: Nonreflective aluminum with permanently etched scale markings graduated in deg F.
7. Pointer: Dark-colored metal.
8. Window: Glass.
9. Ring: Metal.
10. Connector Type(s): Union joint, 360 degrees in horizontal plane, with locking device; with ASME B1.1 screw threads.
11. Thermal System: Liquid-filled bulb in copper-plated steel, aluminum, or brass stem and of length to suit installation.

    a. Design for Air-Duct Installation: With ventilated shroud.
    b. Design for Thermowell Installation: Bare stem.

12. Accuracy: Plus or minus 1 percent of scale range.

2.2 DUCT-THERMOMETER MOUNTING BRACKETS

A. Description: Flanged bracket with screw holes, for attachment to air duct and made to hold thermometer stem.

2.3 THERMOWELLS

A. Thermowells:

1. Standard: ASME B40.200.
2. Description: Pressure-tight, socket-type fitting made for insertion into piping tee fitting.
3. Material for Use with Copper Tubing: CNR.
4. Material for Use with Steel Piping: CRES.
5. Type: Stepped shank unless straight or tapered shank is indicated.
6. External Threads: NPS 1/2, NPS 3/4, or NPS 1, ASME B1.20.1 pipe threads.
7. Internal Threads: 1/2, 3/4, and 1 inch, with ASME B1.1 screw threads.
8. Bore: Diameter required to match thermometer bulb or stem.
9. Insertion Length: Length required to match thermometer bulb or stem.
10. Lagging Extension: Include on thermowells for insulated piping and tubing.
11. Bushings: For converting size of thermowell's internal screw thread to size of thermometer connection.

B. Heat-Transfer Medium: Mixture of graphite and glycerin.

2.4 PRESSURE GAGES

A. Direct-Mounted, Metal-Case, Dial-Type Pressure Gages:

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

   a. AMETEK, Inc.; U.S. Gauge.
   b. Ashcroft Inc.
   c. Ernst Flow Industries.
   d. Flo Fab Inc.
   e. Marsh Bellofram.
   f. Miljoco Corporation.
   g. Noshok.
   h. Palmer Wahl Instrumentation Group.
   i. REOTEMP Instrument Corporation.
   j. Tel-Tru Manufacturing Company.
   k. Trerice, H. O. Co.
   l. Watts Regulator Co.; a div. of Watts Water Technologies, Inc.
   m. Weiss Instruments, Inc.
   n. WIKA Instrument Corporation - USA.
   o. Winters Instruments - U.S.

2. Standard: ASME B40.100.
3. Case: Sealed; 4-1/2-inch nominal diameter.
4. Pressure-Element Assembly: Bourdon tube unless otherwise indicated.
5. Pressure Connection: Brass, with NPS 1/4 or NPS 1/2, ASME B1.20.1 pipe threads and bottom-outlet type unless back-outlet type is indicated.
6. Movement: Mechanical, with link to pressure element and connection to pointer.
7. Dial: Nonreflective aluminum with permanently etched scale markings graduated in psi.
8. Pointer: Dark-colored metal.
9. Window: Glass.
10. Ring: Brass.
11. Accuracy: Grade A, plus or minus 1 percent of middle half of scale range.

2.5 GAGE ATTACHMENTS

A. Snubbers: ASME B40.100, brass; with NPS 1/4 or NPS ½, ASME B1.20.1 pipe threads and piston-type surge-dampening device. Include extension for use on insulated piping.

B. Siphons: Loop-shaped section of brass pipe with NPS 1/4 or NPS ½ pipe threads.

C. Valves: Brass ball, with NPS 1/4 or NPS ½, ASME B1.20.1 pipe threads.

2.6 TEST PLUGS

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1. Flow Design, Inc.
2. Miljoco Corporation.
3. National Meter, Inc.
4. Peterson Equipment Co., Inc.

5. Sisco Manufacturing Company, Inc.
6. Trerice, H. O. Co.
7. Watts Regulator Co.; a div. of Watts Water Technologies, Inc.
8. Weiss Instruments, Inc.

B. Description: Test-station fitting made for insertion into piping tee fitting.

C. Body: Brass or stainless steel with core inserts and gasketed and threaded cap. Include extended stem on units to be installed in insulated piping.

D. Thread Size: NPS 1/4 or NPS 1/2, ASME B1.20.1 pipe thread.

E. Minimum Pressure and Temperature Rating: 500 psig at 200 deg F.

F. Core Inserts: EPDM self-sealing rubber.

2.7 TEST-PLUG KITS

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1. Flow Design, Inc.
2. Miljoco Corporation.
3. National Meter, Inc.
4. Peterson Equipment Co., Inc.
5. Sisco Manufacturing Company, Inc.
6. Trerice, H. O. Co.
7. Watts Regulator Co.; a div. of Watts Water Technologies, Inc.
8. Weiss Instruments, Inc.

B. Furnish one test-plug kit(s) containing two thermometers, one pressure gage and adapter, and carrying case. Thermometer sensing elements, pressure gage, and adapter probes shall be of diameter to fit test plugs and of length to project into piping.

C. Low-Range Thermometer: Small, bimetallic insertion type with 1- to 2-inch- diameter dial and tapered-end sensing element. Dial range shall be at least 25 to 125 deg F.

D. High-Range Thermometer: Small, bimetallic insertion type with 1- to 2-inch- diameter dial and tapered-end sensing element. Dial range shall be at least 0 to 220 deg F.

E. Pressure Gage: Small, Bourdon-tube insertion type with 2- to 3-inch- diameter dial and probe. Dial range shall be at least 0 to 200 psig.

F. Carrying Case: Metal or plastic, with formed instrument padding.

2.8 SIGHT FLOW INDICATORS

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1. Archon Industries, Inc.
2. Dwyer Instruments, Inc.
3. Emerson Process Management; Brooks Instrument.

4. Ernst Co., John C., Inc.
5. Ernst Flow Industries.
6. KOBOLD Instruments, Inc. - USA; KOBOLD Messring GmbH.
7. OPW Engineered Systems; a Dover company.
8. Penberthy; A Brand of Tyco Valves & Controls - Prophetstown.

B. Description: Piping inline-installation device for visual verification of flow.

C. Construction: Bronze or stainless-steel body, with sight glass and ball, flapper, or paddle wheel indicator, and threaded or flanged ends.

D. Minimum Pressure Rating: 150 psig.

E. Minimum Temperature Rating: 200 deg F.

F. End Connections for NPS 2 and Smaller: Threaded.

G. End Connections for NPS 2-1/2 and Larger: Flanged.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Install thermowells with socket extending to center of pipe and in vertical position in piping tees.

B. Install thermowells of sizes required to match thermometer connectors. Include bushings if required to match sizes.

C. Install thermowells with extension on insulated piping.

D. Install direct-mounted thermometers in thermowells and adjust vertical and tilted positions.

E. Install remote-mounted thermometer bulbs in thermowells and install cases on panels; connect cases with tubing and support tubing to prevent kinks. Use minimum tubing length.

F. Install duct-thermometer mounting brackets in walls of ducts. Attach to duct with screws.

G. Install direct-mounted pressure gages in piping tees with pressure gage located on pipe at the most readable position.

H. Install remote-mounted pressure gages on panel.

I. Install test plugs in piping tees.

J. Install flow indicators in piping systems in accessible positions for easy viewing.

K. Assemble and install connections, tubing, and accessories between flow-measuring elements and flowmeters according to manufacturer's written instructions.

L. Install flowmeter elements in accessible positions in piping systems.

M. Install wafer-orifice flowmeter elements between pipe flanges.

N. Install differential-pressure-type flowmeter elements, with at least minimum straight lengths of pipe, upstream and downstream from element according to manufacturer's written instructions.

O. Install permanent indicators on walls or brackets in accessible and readable positions.

P. Install connection fittings in accessible locations for attachment to portable indicators.

Q. Mount thermal-energy meters on wall if accessible; if not, provide brackets to support meters.

R. Install thermometers in the following locations:

1. Inlet and outlet of each hydronic coil in air-handling units.
2. Outside-, return-, supply-, and mixed-air ducts.

S. Install pressure gages in the following locations:

1. Discharge of each pressure-reducing valve.

3.2 CONNECTIONS

A. Install meters and gages adjacent to machines and equipment to allow service and maintenance of meters, gages, machines, and equipment.

B. Connect flowmeter-system elements to meters.

C. Connect flowmeter transmitters to meters.

D. Connect thermal-energy meter transmitters to meters.

3.3 ADJUSTING

A. After installation, calibrate meters according to manufacturer's written instructions.

B. Adjust faces of meters and gages to proper angle for best visibility.

3.4 THERMOMETER SCHEDULE

A. Thermometers at outside-, return-, supply-, and mixed-air ducts shall be the following:

1. Direct-mounted, metal-case, vapor-actuated type.

B. Thermometer stems shall be of length to match thermowell insertion length.

3.5 THERMOMETER SCALE-RANGE SCHEDULE

A. Scale Range for Air Ducts: 0 to 100 deg F.

3.6 PRESSURE-GAGE SCHEDULE

A. Pressure gages at discharge of each pressure-reducing valve shall be the following:

1. Sealed, direct-mounted, metal case.

B. Pressure gages at inlet and outlet of each chiller chilled-water and condenser-water connection shall be the following:

1. Sealed, direct-mounted, metal case.

C. Pressure gages at suction and discharge of each pump shall be the following:

1. Sealed, direct-mounted, metal case.

END OF SECTION 230519

SECTION 23 05 29 - HANGERS AND SUPPORTS FOR HVAC PIPING AND EQUIPMENT

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section Includes:

1. Metal pipe hangers and supports.
2. Trapeze pipe hangers.
3. Metal framing systems.
4. Thermal-hanger shield inserts.
5. Fastener systems.
6. Pipe stands.
7. Equipment supports.

B. Related Sections:

1. Section 230516 "Expansion Fittings and Loops for HVAC Piping" for pipe guides and anchors.
2. Section 230548 "Vibration and Seismic Controls for HVAC for vibration isolation devices.
3. Section 233113 "Metal Ducts" for duct hangers and supports.

1.3 DEFINITIONS

A. MSS: Manufacturers Standardization Society of The Valve and Fittings Industry Inc.

1.4 PERFORMANCE REQUIREMENTS

A. Delegated Design: Design trapeze pipe hangers and equipment supports, including comprehensive engineering analysis by a qualified professional engineer, using performance requirements and design criteria indicated.

B. Structural Performance: Hangers and supports for HVAC piping and equipment shall withstand the effects of gravity loads and stresses within limits and under conditions indicated according to ASCE/SEI 7.

1. Design supports for multiple pipes, including pipe stands, capable of supporting combined weight of supported systems, system contents, and test water.
2. Design equipment supports capable of supporting combined operating weight of supported equipment and connected systems and components.
3. Design seismic-restraint hangers and supports for piping and equipment.

1.5 ACTION SUBMITTALS

A. Product Data: For each type of product indicated.

B. Shop Drawings: Signed and sealed by a qualified professional engineer. Show fabrication and installation details and include calculations for the following; include Product Data for components:

1. Trapeze pipe hangers.
2. Metal framing systems.
3. Fiberglass strut systems.
4. Pipe stands.
5. Equipment supports.

1.6 INFORMATIONAL SUBMITTALS

A. Welding certificates.

1.7 QUALITY ASSURANCE

A. Structural Steel Welding Qualifications: Qualify procedures and personnel according to AWS D1.1/D1.1M, "Structural Welding Code - Steel."

B. Pipe Welding Qualifications: Qualify procedures and operators according to ASME Boiler and Pressure Vessel Code.

PART 2 - PRODUCTS

2.1 METAL PIPE HANGERS AND SUPPORTS

A. Carbon-Steel Pipe Hangers and Supports:

1. Description: MSS SP-58, Types 1 through 58, factory-fabricated components.
2. Galvanized Metallic Coatings: Pregalvanized or hot dipped.
3. Nonmetallic Coatings: Plastic coating, jacket, or liner.
4. Padded Hangers: Hanger with fiberglass or other pipe insulation pad or cushion to support bearing surface of piping.
5. Hanger Rods: Continuous-thread rod, nuts, and washer made of carbon steel.

B. Stainless-Steel Pipe Hangers and Supports:

1. Description: MSS SP-58, Types 1 through 58, factory-fabricated components.
2. Padded Hangers: Hanger with fiberglass or other pipe insulation pad or cushion to support bearing surface of piping.
3. Hanger Rods: Continuous-thread rod, nuts, and washer made of stainless steel.

C. Copper Pipe Hangers:

1. Description: MSS SP-58, Types 1 through 58, copper-coated-steel, factory-fabricated components.
2. Hanger Rods: Continuous-thread rod, nuts, and washer made of copper-coated steel.

2.2 TRAPEZE PIPE HANGERS

A. Description: MSS SP-69, Type 59, shop- or field-fabricated pipe-support assembly made from structural carbon-steel shapes with MSS SP-58 carbon-steel hanger rods, nuts, saddles, and U-bolts.

2.3 METAL FRAMING SYSTEMS

A. MFMA Manufacturer Metal Framing Systems:

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

   a. Allied Tube & Conduit.
   b. Cooper B-Line, Inc.
   c. Flex-Strut Inc.
   d. GS Metals Corp.
   e. Thomas & Betts Corporation.
   f. Unistrut Corporation; Tyco International, Ltd.

2. Description: Shop- or field-fabricated pipe-support assembly for supporting multiple parallel pipes.
3. Standard: MFMA-4.
4. Channels: Continuous slotted steel channel with inturned lips.
5. Channel Nuts: Formed or stamped steel nuts or other devices designed to fit into channel slot and, when tightened, prevent slipping along channel.
6. Hanger Rods: Continuous-thread rod, nuts, and washer made of carbon steel.
7. Metallic Coating: Electroplated zinc.

B. Non-MFMA Manufacturer Metal Framing Systems:

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

   a. Allied Tube & Conduit.
   b. Cooper B-Line, Inc.
   c. Flex-Strut Inc.
   d. GS Metals Corp.
   e. Thomas & Betts Corporation.
   f. Unistrut Corporation; Tyco International, Ltd.

2. Description: Shop- or field-fabricated pipe-support assembly made of steel channels, accessories, fittings, and other components for supporting multiple parallel pipes.
3. Standard: Comply with MFMA-4.
4. Channels: Continuous slotted steel channel with inturned lips.
5. Channel Nuts: Formed or stamped steel nuts or other devices designed to fit into channel slot and, when tightened, prevent slipping along channel.
6. Hanger Rods: Continuous-thread rod, nuts, and washer made of carbon steel.
7. Coating: Zinc.

2.4 THERMAL-HANGER SHIELD INSERTS

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1. Carpenter & Paterson, Inc.
2. Clement Support Services.
3. ERICO International Corporation.
4. National Pipe Hanger Corporation.
5. PHS Industries, Inc.
6. Pipe Shields, Inc.; a subsidiary of Piping Technology & Products, Inc.
7. Piping Technology & Products, Inc.
8. Rilco Manufacturing Co., Inc.
9. Value Engineered Products, Inc.

B. Insulation-Insert Material for Cold Piping: Water-repellent treated, ASTM C 533, Type I calcium silicate with 100-psig minimum compressive strength.

C. Insulation-Insert Material for Hot Piping: Water-repellent treated, ASTM C 533, Type I calcium silicate with 100-psig minimum compressive strength.

D. For Trapeze or Clamped Systems: Insert and shield shall cover entire circumference of pipe.

E. For Clevis or Band Hangers: Insert and shield shall cover lower 180 degrees of pipe.

F. Insert Length: Extend 2 inches beyond sheet metal shield for piping operating below ambient air temperature.

2.5 FASTENER SYSTEMS

A. Powder-Actuated Fasteners: Threaded-steel stud, for use in hardened portland cement concrete with pull-out, tension, and shear capacities appropriate for supported loads and building materials where used.

B. Mechanical-Expansion Anchors: Insert-wedge-type, **zinc-coated** steel anchors, for use in hardened portland cement concrete; with pull-out, tension, and shear capacities appropriate for supported loads and building materials where used.

2.6 PIPE STANDS

A. General Requirements for Pipe Stands: Shop- or field-fabricated assemblies made of manufactured corrosion-resistant components to support roof-mounted piping.

B. Compact Pipe Stand: One-piece plastic unit with integral-rod roller, pipe clamps, or V-shaped cradle to support pipe, for roof installation without membrane penetration.

C. Low-Type, Single-Pipe Stand: One-piece plastic base unit with plastic roller, for roof installation without membrane penetration.

D. High-Type, Single-Pipe Stand:

1. Description: Assembly of base, vertical and horizontal members, and pipe support, for roof installation without membrane penetration.

2. Base: Plastic.
3. Vertical Members: Two or more cadmium-plated-steel or stainless-steel, continuous-thread rods.
4. Horizontal Member: Cadmium-plated-steel or stainless-steel rod with plastic or stainless-steel, roller-type pipe support.

E. High-Type, Multiple-Pipe Stand:

1. Description: Assembly of bases, vertical and horizontal members, and pipe supports, for roof installation without membrane penetration.
2. Bases: One or more; plastic.
3. Vertical Members: Two or more protective-coated-steel channels.
4. Horizontal Member: Protective-coated-steel channel.
5. Pipe Supports: Galvanized-steel, clevis-type pipe hangers.

F. Curb-Mounted-Type Pipe Stands: Shop- or field-fabricated pipe supports made from structural-steel shapes, continuous-thread rods, and rollers, for mounting on permanent stationary roof curb.

2.7 EQUIPMENT SUPPORTS

A. Description: Welded, shop- or field-fabricated equipment support made from structural carbon-steel shapes.

2.8 MISCELLANEOUS MATERIALS

A. Structural Steel: ASTM A 36/A 36M, carbon-steel plates, shapes, and bars; black and galvanized.

B. Grout: ASTM C 1107, factory-mixed and -packaged, dry, hydraulic-cement, nonshrink and nonmetallic grout; suitable for interior and exterior applications.

1. Properties: Nonstaining, noncorrosive, and nongaseous.
2. Design Mix: 5000-psi, 28-day compressive strength.

PART 3 - EXECUTION

3.1 HANGER AND SUPPORT INSTALLATION

A. Metal Pipe-Hanger Installation: Comply with MSS SP-69 and MSS SP-89. Install hangers, supports, clamps, and attachments as required to properly support piping from the building structure.

B. Metal Trapeze Pipe-Hanger Installation: Comply with MSS SP-69 and MSS SP-89. Arrange for grouping of parallel runs of horizontal piping, and support together on field-fabricated trapeze pipe hangers.

1. Pipes of Various Sizes: Support together and space trapezes for smallest pipe size or install intermediate supports for smaller diameter pipes as specified for individual pipe hangers.

2. Field fabricate from ASTM A 36/A 36M, carbon-steel shapes selected for loads being supported. Weld steel according to AWS D1.1/D1.1M.

C. Metal Framing System Installation: Arrange for grouping of parallel runs of piping, and support together on field-assembled metal framing systems.

D. Fiberglass Strut System Installation: Arrange for grouping of parallel runs of piping, and support together on field-assembled fiberglass struts.

E. Thermal-Hanger Shield Installation: Install in pipe hanger or shield for insulated piping.

F. Fastener System Installation:

1. Install powder-actuated fasteners for use in lightweight concrete or concrete slabs less than 4 inches thick in concrete after concrete is placed and completely cured. Use operators that are licensed by powder-actuated tool manufacturer. Install fasteners according to powder-actuated tool manufacturer's operating manual.
2. Install mechanical-expansion anchors in concrete after concrete is placed and completely cured. Install fasteners according to manufacturer's written instructions.

G. Pipe Stand Installation:

1. Pipe Stand Types except Curb-Mounted Type: Assemble components and mount on smooth roof surface. Do not penetrate roof membrane.
2. Curb-Mounted-Type Pipe Stands: Assemble components or fabricate pipe stand and mount on permanent, stationary roof curb. See Section 077200 "Roof Accessories" for curbs.

H. Install hangers and supports complete with necessary attachments, inserts, bolts, rods, nuts, washers, and other accessories.

I. Equipment Support Installation: Fabricate from welded-structural-steel shapes.

J. Install hangers and supports to allow controlled thermal and seismic movement of piping systems, to permit freedom of movement between pipe anchors, and to facilitate action of expansion joints, expansion loops, expansion bends, and similar units.

K. Install lateral bracing with pipe hangers and supports to prevent swaying.

L. Install building attachments within concrete slabs or attach to structural steel. Install additional attachments at concentrated loads, including valves, flanges, and strainers, **NPS 2-1/2** and larger and at changes in direction of piping. Install concrete inserts before concrete is placed; fasten inserts to forms and install reinforcing bars through openings at top of inserts.

M. Load Distribution: Install hangers and supports so that piping live and dead loads and stresses from movement will not be transmitted to connected equipment.

N. Pipe Slopes: Install hangers and supports to provide indicated pipe slopes and to not exceed maximum pipe deflections allowed by ASME B31.9 for building services piping.

O. Insulated Piping:

1. Attach clamps and spacers to piping.

a. Piping Operating above Ambient Air Temperature: Clamp may project through insulation.
b. Piping Operating below Ambient Air Temperature: Use thermal-hanger shield insert with clamp sized to match OD of insert.
c. Do not exceed pipe stress limits allowed by ASME B31.9 for building services piping.

2. Install MSS SP-58, Type 39, protection saddles if insulation without vapor barrier is indicated. Fill interior voids with insulation that matches adjoining insulation.

   a. Option: Thermal-hanger shield inserts may be used. Include steel weight-distribution plate for pipe NPS 4 and larger if pipe is installed on rollers.

3. Install MSS SP-58, Type 40, protective shields on cold piping with vapor barrier. Shields shall span an arc of 180 degrees.

   a. Option: Thermal-hanger shield inserts may be used. Include steel weight-distribution plate for pipe NPS 4 and larger if pipe is installed on rollers.

4. Shield Dimensions for Pipe: Not less than the following:

   a. NPS 1/4 to NPS 3-1/2: 12 inches long and 0.048 inch thick.
   b. NPS 4: 12 inches long and 0.06 inch thick.
   c. NPS 5 and NPS 6: 18 inches long and 0.06 inch thick.
   d. NPS 8 to NPS 14: 24 inches long and 0.075 inch thick.
   e. NPS 16 to NPS 24: 24 inches long and 0.105 inch thick.

5. Pipes NPS 8 and Larger: Include wood or reinforced calcium-silicate-insulation inserts of length at least as long as protective shield.
6. Thermal-Hanger Shields: Install with insulation same thickness as piping insulation.

3.2 EQUIPMENT SUPPORTS

A. Fabricate structural-steel stands to suspend equipment from structure overhead or to support equipment above floor.

B. Grouting: Place grout under supports for equipment and make bearing surface smooth.

C. Provide lateral bracing, to prevent swaying, for equipment supports.

3.3 METAL FABRICATIONS

A. Cut, drill, and fit miscellaneous metal fabrications for trapeze pipe hangers and equipment supports.

B. Fit exposed connections together to form hairline joints. Field weld connections that cannot be shop welded because of shipping size limitations.

C. Field Welding: Comply with AWS D1.1/D1.1M procedures for shielded, metal arc welding; appearance and quality of welds; and methods used in correcting welding work; and with the following:

1. Use materials and methods that minimize distortion and develop strength and corrosion resistance of base metals.
2. Obtain fusion without undercut or overlap.
3. Remove welding flux immediately.
4. Finish welds at exposed connections so no roughness shows after finishing and so contours of welded surfaces match adjacent contours.

3.4 ADJUSTING

A. Hanger Adjustments: Adjust hangers to distribute loads equally on attachments and to achieve indicated slope of pipe.

B. Trim excess length of continuous-thread hanger and support rods to 1-1/2 inches.

3.5 PAINTING

A. Touchup: Clean field welds and abraded areas of shop paint. Paint exposed areas immediately after erecting hangers and supports. Use same materials as used for shop painting. Comply with SSPC-PA 1 requirements for touching up field-painted surfaces.

1. Apply paint by brush or spray to provide a minimum dry film thickness of 2.0 mils.

B. Galvanized Surfaces: Clean welds, bolted connections, and abraded areas and apply galvanizing-repair paint to comply with ASTM A 780.

3.6 HANGER AND SUPPORT SCHEDULE

A. Specific hanger and support requirements are in Sections specifying piping systems and equipment.

B. Comply with MSS SP-69 for pipe-hanger selections and applications that are not specified in piping system Sections.

C. Use hangers and supports with galvanized metallic coatings for piping and equipment that will not have field-applied finish.

D. Use nonmetallic coatings on attachments for electrolytic protection where attachments are in direct contact with copper tubing.

E. Use carbon-steel pipe hangers and supports and metal framing systems and attachments for general service applications.

F. Use stainless-steel pipe hangers and stainless-steel attachments for hostile environment applications.

G. Use copper-plated pipe hangers and copper attachments for copper piping and tubing.

H. Use padded hangers for piping that is subject to scratching.

I. Use thermal-hanger shield inserts for insulated piping and tubing.

J. Horizontal-Piping Hangers and Supports: Unless otherwise indicated and except as specified in piping system Sections, install the following types:

1. Adjustable, Steel Clevis Hangers (MSS Type 1): For suspension of noninsulated or insulated, stationary pipes NPS 1/2 to NPS 30.
2. Yoke-Type Pipe Clamps (MSS Type 2): For suspension of up to 1050 deg F, pipes NPS 4 to NPS 24, requiring up to 4 inches of insulation.
3. Carbon- or Alloy-Steel, Double-Bolt Pipe Clamps (MSS Type 3): For suspension of pipes NPS 3/4 to NPS 36, requiring clamp flexibility and up to 4 inches of insulation.
4. Steel Pipe Clamps (MSS Type 4): For suspension of cold and hot pipes NPS 1/2 to NPS 24 if little or no insulation is required.
5. Pipe Hangers (MSS Type 5): For suspension of pipes NPS 1/2 to NPS 4, to allow off-center closure for hanger installation before pipe erection.
6. Adjustable, Swivel Split- or Solid-Ring Hangers (MSS Type 6): For suspension of noninsulated, stationary pipes NPS 3/4 to NPS 8.
7. Adjustable, Steel Band Hangers (MSS Type 7): For suspension of noninsulated, stationary pipes NPS 1/2 to NPS 8.
8. Adjustable Band Hangers (MSS Type 9): For suspension of noninsulated, stationary pipes NPS 1/2 to NPS 8.
9. Adjustable, Swivel-Ring Band Hangers (MSS Type 10): For suspension of noninsulated, stationary pipes NPS 1/2 to NPS 8.
10. Split Pipe Ring with or without Turnbuckle Hangers (MSS Type 11): For suspension of noninsulated, stationary pipes NPS 3/8 to NPS 8.
11. Extension Hinged or Two-Bolt Split Pipe Clamps (MSS Type 12): For suspension of noninsulated, stationary pipes NPS 3/8 to NPS 3.
12. U-Bolts (MSS Type 24): For support of heavy pipes NPS 1/2 to NPS 30.
13. Clips (MSS Type 26): For support of insulated pipes not subject to expansion or contraction.
14. Pipe Saddle Supports (MSS Type 36): For support of pipes NPS 4 to NPS 36, with steel-pipe base stanchion support and cast-iron floor flange or carbon-steel plate.
15. Pipe Stanchion Saddles (MSS Type 37): For support of pipes NPS 4 to NPS 36, with steel-pipe base stanchion support and cast-iron floor flange or carbon-steel plate, and with U-bolt to retain pipe.
16. Adjustable Pipe Saddle Supports (MSS Type 38): For stanchion-type support for pipes NPS 2-1/2 to NPS 36 if vertical adjustment is required, with steel-pipe base stanchion support and cast-iron floor flange.
17. Single-Pipe Rolls (MSS Type 41): For suspension of pipes NPS 1 to NPS 30, from two rods if longitudinal movement caused by expansion and contraction might occur.
18. Adjustable Roller Hangers (MSS Type 43): For suspension of pipes NPS 2-1/2 to NPS 24, from single rod if horizontal movement caused by expansion and contraction might occur.
19. Complete Pipe Rolls (MSS Type 44): For support of pipes NPS 2 to NPS 42 if longitudinal movement caused by expansion and contraction might occur but vertical adjustment is not necessary.
20. Pipe Roll and Plate Units (MSS Type 45): For support of pipes NPS 2 to NPS 24 if small horizontal movement caused by expansion and contraction might occur and vertical adjustment is not necessary.
21. Adjustable Pipe Roll and Base Units (MSS Type 46): For support of pipes NPS 2 to NPS 30 if vertical and lateral adjustment during installation might be required in addition to expansion and contraction.

K. Vertical-Piping Clamps: Unless otherwise indicated and except as specified in piping system Sections, install the following types:

1. Extension Pipe or Riser Clamps (MSS Type 8): For support of pipe risers NPS 3/4 to NPS 24.

2. Carbon- or Alloy-Steel Riser Clamps (MSS Type 42): For support of pipe risers NPS 3/4 to NPS 24 if longer ends are required for riser clamps.

L. Hanger-Rod Attachments: Unless otherwise indicated and except as specified in piping system Sections, install the following types:

1. Steel Turnbuckles (MSS Type 13): For adjustment up to 6 inches for heavy loads.
2. Steel Clevises (MSS Type 14): For 120 to 450 deg F piping installations.
3. Swivel Turnbuckles (MSS Type 15): For use with MSS Type 11, split pipe rings.
4. Malleable-Iron Sockets (MSS Type 16): For attaching hanger rods to various types of building attachments.
5. Steel Weldless Eye Nuts (MSS Type 17): For 120 to 450 deg F piping installations.

M. Building Attachments: Unless otherwise indicated and except as specified in piping system Sections, install the following types:

1. Steel or Malleable Concrete Inserts (MSS Type 18): For upper attachment to suspend pipe hangers from concrete ceiling.
2. Top-Beam C-Clamps (MSS Type 19): For use under roof installations with bar-joist construction, to attach to top flange of structural shape.
3. Side-Beam or Channel Clamps (MSS Type 20): For attaching to bottom flange of beams, channels, or angles.
4. Center-Beam Clamps (MSS Type 21): For attaching to center of bottom flange of beams.
5. Welded Beam Attachments (MSS Type 22): For attaching to bottom of beams if loads are considerable and rod sizes are large.
6. C-Clamps (MSS Type 23): For structural shapes.
7. Top-Beam Clamps (MSS Type 25): For top of beams if hanger rod is required tangent to flange edge.
8. Side-Beam Clamps (MSS Type 27): For bottom of steel I-beams.
9. Steel-Beam Clamps with Eye Nuts (MSS Type 28): For attaching to bottom of steel I-beams for heavy loads.
10. Linked-Steel Clamps with Eye Nuts (MSS Type 29): For attaching to bottom of steel I-beams for heavy loads, with link extensions.
11. Malleable-Beam Clamps with Extension Pieces (MSS Type 30): For attaching to structural steel.
12. Welded-Steel Brackets: For support of pipes from below or for suspending from above by using clip and rod. Use one of the following for indicated loads:

    a. Light (MSS Type 31): 750 lb.
    b. Medium (MSS Type 32): 1500 lb.
    c. Heavy (MSS Type 33): 3000 lb.

13. Side-Beam Brackets (MSS Type 34): For sides of steel or wooden beams.
14. Plate Lugs (MSS Type 57): For attaching to steel beams if flexibility at beam is required.
15. Horizontal Travelers (MSS Type 58): For supporting piping systems subject to linear horizontal movement where headroom is limited.

N. Saddles and Shields: Unless otherwise indicated and except as specified in piping system Sections, install the following types:

1. Steel-Pipe-Covering Protection Saddles (MSS Type 39): To fill interior voids with insulation that matches adjoining insulation.
2. Protection Shields (MSS Type 40): Of length recommended in writing by manufacturer to prevent crushing insulation.
3. Thermal-Hanger Shield Inserts: For supporting insulated pipe.

O. Spring Hangers and Supports: Unless otherwise indicated and except as specified in piping system Sections, install the following types:

1. Restraint-Control Devices (MSS Type 47): Where indicated to control piping movement.
2. Spring Cushions (MSS Type 48): For light loads if vertical movement does not exceed 1-1/4 inches.
3. Spring-Cushion Roll Hangers (MSS Type 49): For equipping Type 41, roll hanger with springs.
4. Spring Sway Braces (MSS Type 50): To retard sway, shock, vibration, or thermal expansion in piping systems.
5. Variable-Spring Hangers (MSS Type 51): Preset to indicated load and limit variability factor to 25 percent to allow expansion and contraction of piping system from hanger.
6. Variable-Spring Base Supports (MSS Type 52): Preset to indicated load and limit variability factor to 25 percent to allow expansion and contraction of piping system from base support.
7. Variable-Spring Trapeze Hangers (MSS Type 53): Preset to indicated load and limit variability factor to 25 percent to allow expansion and contraction of piping system from trapeze support.
8. Constant Supports: For critical piping stress and if necessary to avoid transfer of stress from one support to another support, critical terminal, or connected equipment. Include auxiliary stops for erection, hydrostatic test, and load-adjustment capability. These supports include the following types:

    a. Horizontal (MSS Type 54): Mounted horizontally.
    b. Vertical (MSS Type 55): Mounted vertically.
    c. Trapeze (MSS Type 56): Two vertical-type supports and one trapeze member.

P. Comply with MSS SP-69 for trapeze pipe-hanger selections and applications that are not specified in piping system Sections.

Q. Comply with MFMA-103 for metal framing system selections and applications that are not specified in piping system Sections.

R. Use mechanical-expansion anchors instead of building attachments where required in concrete construction.

END OF SECTION 230529

SECTION 23 05 48 - VIBRATION AND SEISMIC CONTROLS FOR HVAC

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section Includes:

1. Elastomeric isolation pads.
2. Restrained-spring isolators.
3. Elastomeric hangers.
4. Spring hangers.
5. Snubbers.
6. Restraint channel bracings.
7. Restraint cables.
8. Seismic-restraint accessories.
9. Mechanical anchor bolts.
10. Adhesive anchor bolts.

1.3 DEFINITIONS

A. IBC: International Building Code.

B. ICC-ES: ICC-Evaluation Service.

C. OSHPD: Office of Statewide Health Planning & Development (for the State of California).

1.4 ACTION SUBMITTALS

A. Product Data: For each type of product.

1. Include rated load, rated deflection, and overload capacity for each vibration isolation device.
2. Illustrate and indicate style, material, strength, fastening provision, and finish for each type and size of vibration isolation device and seismic-restraint component required.

    a. Tabulate types and sizes of seismic restraints, complete with report numbers and rated strength in tension and shear as evaluated by an evaluation service member of ICC-ES, OSHPD, or an agency acceptable to authorities having jurisdiction.
    b. Annotate to indicate application of each product submitted and compliance with requirements.

3. Interlocking Snubbers: Include ratings for horizontal, vertical, and combined loads.

B. Shop Drawings:

1. Detail fabrication and assembly of equipment bases. Detail fabrication including anchorages and attachments to structure and to supported equipment. Include adjustable motor bases, rails, and frames for equipment mounting.
2. Vibration Isolation Base Details: Detail fabrication including anchorages and attachments to structure and to supported equipment. Include adjustable motor bases, rails, and frames for equipment mounting.

1.5 INFORMATIONAL SUBMITTALS

A. Coordination Drawings: Show coordination of vibration isolation device installation and seismic bracing for HVAC piping and equipment with other systems and equipment in the vicinity, including other supports and restraints, if any.

B. Qualification Data: For professional engineer and testing agency.

C. Welding certificates.

D. Field quality-control reports.

1.6 QUALITY ASSURANCE

A. Testing Agency Qualifications: An independent agency, with the experience and capability to conduct the testing indicated, that is an NRTL as defined by OSHA in 29 CFR 1910.7 and that is acceptable to authorities having jurisdiction.

B. Comply with seismic-restraint requirements in the IBC unless requirements in this Section are more stringent.

C. Welding Qualifications: Qualify procedures and personnel according to AWS D1.1/D1.1M, "Structural Welding Code - Steel."

D. Seismic-restraint devices shall have horizontal and vertical load testing and analysis and shall bear anchorage preapproval OPA number from OSHPD, preapproval by ICC-ES, or preapproval by another agency acceptable to authorities having jurisdiction, showing maximum seismic-restraint ratings. Ratings based on independent testing are preferred to ratings based on calculations. If preapproved ratings are unavailable, submittals based on independent testing are preferred. Calculations (including combining shear and tensile loads) to support seismic-restraint designs must be signed and sealed by a qualified professional engineer.

PART 2 - PRODUCTS

2.1 ELASTOMERIC ISOLATION PADS

A. Elastomeric Isolation Pads:

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

a. Ace Mountings Co., Inc.

b. California Dynamics Corporation.
c. Isolation Technology, Inc.
d. Kinetics Noise Control, Inc.
e. Mason Industries, Inc.
f. Vibration Eliminator Co., Inc.
g. Vibration Isolation.
h. Vibration Mountings & Controls, Inc.

2. Fabrication: Single or multiple layers of sufficient durometer stiffness for uniform loading over pad area.
3. Size: Factory or field cut to match requirements of supported equipment.
4. Pad Material: Oil and water resistant with elastomeric properties.
5. Surface Pattern: Smooth pattern.
6. Infused nonwoven cotton or synthetic fibers.

2.2 RESTRAINED-SPRING ISOLATORS

A. Freestanding, Laterally Stable, Open-Spring Isolators with Vertical-Limit Stop Restraint:

1. Manufacturers: Subject to compliance with requirements, products by one of the following:

a. Ace Mountings Co., Inc.
b. California Dynamics Corporation.
c. Isolation Technology, Inc.
d. Kinetics Noise Control, Inc.
e. Mason Industries, Inc.
f. Vibration Eliminator Co., Inc.
g. Vibration Isolation.
h. Vibration Mountings & Controls, Inc.

2. Housing: Steel housing with vertical-limit stops to prevent spring extension due to weight being removed.

a. Base with holes for bolting to structure with an elastomeric isolator pad attached to the underside. Bases shall limit floor load to 500 psig.
b. Top plate with threaded mounting holes.
c. Internal leveling bolt that acts as blocking during installation.

3. Restraint: Limit stop as required for equipment and authorities having jurisdiction.
4. Outside Spring Diameter: Not less than 80 percent of the compressed height of the spring at rated load.
5. Minimum Additional Travel: 50 percent of the required deflection at rated load.
6. Lateral Stiffness: More than 80 percent of rated vertical stiffness.
7. Overload Capacity: Support 200 percent of rated load, fully compressed, without deformation or failure.

2.3 ELASTOMERIC HANGERS

A. Elastomeric Mount in a Steel Frame with Upper and Lower Steel Hanger Rods:

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

a. Ace Mountings Co., Inc.
b. California Dynamics Corporation.
c. Isolation Technology, Inc.
d. Kinetics Noise Control, Inc.
e. Mason Industries, Inc.
f. Vibration Eliminator Co., Inc.
g. Vibration Mountings & Controls, Inc.

2. Frame: Steel, fabricated with a connection for an upper threaded hanger rod and an opening on the underside to allow for a maximum of 30 degrees of angular lower hanger-rod misalignment without binding or reducing isolation efficiency.
3. Dampening Element: Molded, oil-resistant rubber, neoprene, or other elastomeric material with a projecting bushing for the underside opening preventing steel to steel contact.

2.4 SPRING HANGERS

A. Combination Coil-Spring and Elastomeric-Insert Hanger with Spring and Insert in Compression:

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

a. Ace Mountings Co., Inc.
b. California Dynamics Corporation.
c. Kinetics Noise Control, Inc.
d. Mason Industries, Inc.
e. Vibration Eliminator Co., Inc.
f. Vibration Isolation.
g. Vibration Mountings & Controls, Inc.

2. Frame: Steel, fabricated for connection to threaded hanger rods and to allow for a maximum of 30 degrees of angular hanger-rod misalignment without binding or reducing isolation efficiency.
3. Outside Spring Diameter: Not less than 80 percent of the compressed height of the spring at rated load.
4. Minimum Additional Travel: 50 percent of the required deflection at rated load.
5. Lateral Stiffness: More than 80 percent of rated vertical stiffness.
6. Overload Capacity: Support 200 percent of rated load, fully compressed, without deformation or failure.
7. Elastomeric Element: Molded, oil-resistant rubber or neoprene. Steel-washer-reinforced cup to support spring and bushing projecting through bottom of frame.
8. Adjustable Vertical Stop: Steel washer with neoprene washer "up-stop" on lower threaded rod.
9. Self-centering hanger-rod cap to ensure concentricity between hanger rod and support spring coil.

2.5 SNUBBERS

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1. Kinetics Noise Control, Inc.
2. Mason Industries, Inc.

3. Vibration Mountings & Controls, Inc.

B. Description: Factory fabricated using welded structural-steel shapes and plates, anchor bolts, and replaceable resilient isolation washers and bushings.

1. Anchor bolts for attaching to concrete shall be seismic-rated, drill-in, and stud-wedge or female-wedge type.
2. Resilient Isolation Washers and Bushings: Oil- and water-resistant neoprene.
3. Maximum 1/4-inch air gap, and minimum 1/4-inch- thick resilient cushion.

2.6 RESTRAINT CHANNEL BRACINGS

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1. Cooper B-Line, Inc.
2. Hilti, Inc.
3. Mason Industries, Inc.
4. Unistrut.

B. Description: MFMA-4, shop- or field-fabricated bracing assembly made of slotted steel channels with accessories for attachment to braced component at one end and to building structure at the other end and other matching components and with corrosion-resistant coating; rated in tension, compression, and torsion forces.

2.7 RESTRAINT CABLES

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1. Kinetics Noise Control, Inc.
2. Loos & Co., Inc.
3. Vibration Mountings & Controls, Inc.

B. Restraint Cables: ASTM A 603 galvanized-steel cables. End connections made of steel assemblies with thimbles, brackets, swivel, and bolts designed for restraining cable service; with a minimum of two clamping bolts for cable engagement.

2.8 SEISMIC-RESTRAINT ACCESSORIES

A. Manufacturers: Subject to compliance with requirements provide products by one of the following:

1. Cooper B-Line, Inc.
2. Kinetics Noise Control, Inc.
3. Mason Industries, Inc.
4. TOLCO.

B. Hanger-Rod Stiffener: Reinforcing steel angle clamped to hanger rod.

C. Hinged and Swivel Brace Attachments: Multifunctional steel connectors for attaching hangers to restraint cables.

D. Bushings for Floor-Mounted Equipment Anchor Bolts: Neoprene bushings designed for rigid equipment mountings, and matched to type and size of anchor bolts and studs.

E. Bushing Assemblies for Wall-Mounted Equipment Anchorage: Assemblies of neoprene elements and steel sleeves designed for rigid equipment mountings, and matched to type and size of attachment devices used.

F. Resilient Isolation Washers and Bushings: One-piece, molded, oil- and water-resistant neoprene, with a flat washer face.

2.9 MECHANICAL ANCHOR BOLTS

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1. Cooper B-Line, Inc.
2. Hilti, Inc.
3. Kinetics Noise Control, Inc.
4. Mason Industries, Inc.

B. Mechanical Anchor Bolts: Drilled-in and stud-wedge or female-wedge type in zinc-coated steel for interior applications and stainless steel for exterior applications. Select anchor bolts with strength required for anchor and as tested according to ASTM E 488.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine areas and equipment to receive vibration isolation and seismic- and wind-control devices for compliance with requirements for installation tolerances and other conditions affecting performance of the Work.

B. Examine roughing-in of reinforcement and cast-in-place anchors to verify actual locations before installation.

C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 APPLICATIONS

A. Multiple Pipe Supports: Secure pipes to trapeze member with clamps approved for application by an evaluation service member of ICC-ES, OSHPD, or an agency acceptable to authorities having jurisdiction.

B. Hanger-Rod Stiffeners: Install hanger-rod stiffeners where indicated or scheduled on Drawings to receive them and where required to prevent buckling of hanger rods due to seismic forces.

C. Strength of Support and Seismic-Restraint Assemblies: Where not indicated, select sizes of components so strength is adequate to carry present and future static and seismic loads within specified loading limits.

3.3 VIBRATION CONTROL AND SEISMIC-RESTRAINT DEVICE INSTALLATION

A. Coordinate the location of embedded connection hardware with supported equipment attachment and mounting points and with requirements for concrete reinforcement and formwork specified in Section 033000 "Cast-in-Place Concrete."

B. Installation of vibration isolators must not cause any change of position of equipment, piping, or ductwork resulting in stresses or misalignment.

C. Comply with requirements in Section 077200 "Roof Accessories" for installation of roof curbs, equipment supports, and roof penetrations.

D. Equipment Restraints:

1. Install seismic snubbers on HVAC equipment mounted on vibration isolators. Locate snubbers as close as possible to vibration isolators and bolt to equipment base and supporting structure.
2. Install resilient bolt isolation washers on equipment anchor bolts where clearance between anchor and adjacent surface exceeds 0.125 inch.
3. Install seismic-restraint devices using methods approved by an evaluation service member of ICC-ES, OSHPD, or an agency acceptable to authorities having jurisdiction that provides required submittals for component.

E. Piping Restraints:

1. Comply with requirements in MSS SP-127.
2. Space lateral supports a maximum of 40 feet o.c., and longitudinal supports a maximum of 80 feet o.c.
3. Brace a change of direction longer than 12 feet.

F. Install cables so they do not bend across edges of adjacent equipment or building structure.

G. Install seismic-restraint devices using methods approved by an evaluation service member of ICC-ES, OSHPD, or an agency acceptable to authorities having jurisdiction that provides required submittals for component.

H. Install bushing assemblies for anchor bolts for floor-mounted equipment, arranged to provide resilient media between anchor bolt and mounting hole in concrete base.

I. Install bushing assemblies for mounting bolts for wall-mounted equipment, arranged to provide resilient media where equipment or equipment-mounting channels are attached to wall.

J. Attachment to Structure: If specific attachment is not indicated, anchor bracing to structure at flanges of beams, at upper truss chords of bar joists, or at concrete members.

K. Drilled-in Anchors:

1. Identify position of reinforcing steel and other embedded items prior to drilling holes for anchors. Do not damage existing reinforcing or embedded items during coring or drilling. Notify the structural engineer if reinforcing steel or other embedded items are encountered during drilling. Locate and avoid prestressed tendons, electrical and telecommunications conduit, and gas lines.
2. Do not drill holes in concrete or masonry until concrete, mortar, or grout has achieved full design strength.

3. Wedge Anchors: Protect threads from damage during anchor installation. Heavy-duty sleeve anchors shall be installed with sleeve fully engaged in the structural element to which anchor is to be fastened.
4. Adhesive Anchors: Clean holes to remove loose material and drilling dust prior to installation of adhesive. Place adhesive in holes proceeding from the bottom of the hole and progressing toward the surface in such a manner as to avoid introduction of air pockets in the adhesive.
5. Set anchors to manufacturer's recommended torque, using a torque wrench.
6. Install zinc-coated steel anchors for interior and stainless-steel anchors for exterior applications.

3.4 ACCOMMODATION OF DIFFERENTIAL SEISMIC MOTION

A. Install flexible connections in piping where they cross seismic joints, where adjacent sections or branches are supported by different structural elements, and where the connections terminate with connection to equipment that is anchored to a different structural element from the one supporting the connections as they approach equipment. Comply with requirements in Section 232113 "Hydronic Piping" for piping flexible connections.

3.5 FIELD QUALITY CONTROL

A. Testing Agency: Engage a qualified testing agency to perform tests and inspections.

B. Perform tests and inspections.

C. Tests and Inspections:

1. Provide evidence of recent calibration of test equipment by a testing agency acceptable to authorities having jurisdiction.
2. Schedule test with Owner, through Architect, before connecting anchorage device to restrained component (unless postconnection testing has been approved), and with at least seven days' advance notice.
3. Obtain Architect's approval before transmitting test loads to structure. Provide temporary load-spreading members.
4. Test at least four of each type and size of installed anchors and fasteners selected by Architect.
5. Test to 90 percent of rated proof load of device.
6. Measure isolator restraint clearance.
7. Measure isolator deflection.
8. Verify snubber minimum clearances.
9. Test and adjust restrained-air-spring isolator controls and safeties.

D. Remove and replace malfunctioning units and retest as specified above.

E. Prepare test and inspection reports.

3.6 ADJUSTING

A. Adjust isolators after piping system is at operating weight.

B. Adjust limit stops on restrained-spring isolators to mount equipment at normal operating height. After equipment installation is complete, adjust limit stops so they are out of contact during normal operation.

END OF SECTION 230548

SECTION 23 05 53 - IDENTIFICATION FOR HVAC PIPING AND EQUIPMENT

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section Includes:

1. Equipment labels.
2. Pipe labels.
3. Duct labels.
4. Stencils.
5. Valve tags.

1.3 ACTION SUBMITTALS

A. Product Data: For each type of product indicated.

B. Equipment Label Schedule: Include a listing of all equipment to be labeled with the proposed content for each label.

C. Valve numbering scheme.

D. Valve Schedules: For each piping system to include in maintenance manuals.

1.4 COORDINATION

A. Coordinate installation of identifying devices with completion of covering and painting of surfaces where devices are to be applied.

B. Coordinate installation of identifying devices with locations of access panels and doors.

C. Install identifying devices before installing acoustical ceilings and similar concealment.

PART 2 - PRODUCTS

2.1 EQUIPMENT LABELS

A. Plastic Labels for Equipment:

1. Material and Thickness: Multilayer, multicolor, plastic labels for mechanical engraving, 1/8 inch thick, and having predrilled holes for attachment hardware.

2. Letter Color: White.
3. Background Color: Black.
4. Maximum Temperature: Able to withstand temperatures up to 160 deg F.
5. Minimum Label Size: Length and width vary for required label content, but not less than 2-1/2 by 3/4 inch.
6. Minimum Letter Size: 1/4 inch for name of units if viewing distance is less than 24 inches, 1/2 inch for viewing distances up to 72 inches, and proportionately larger lettering for greater viewing distances. Include secondary lettering two-thirds to three-fourths the size of principal lettering.
7. Fasteners: Stainless-steel self-tapping screws.
8. Adhesive: Contact-type permanent adhesive, compatible with label and with substrate.

B. Label Content: Include equipment's unique equipment number.

C. Equipment Label Schedule: For each item of equipment to be labeled, on 8-1/2-by-11-inch bond paper. Tabulate equipment identification number, manufacturer, model number, and identify Drawing numbers where equipment is indicated (plans, details, and schedules), plus the Specification Section number and title where equipment is specified. Equipment schedule shall be included in operation and maintenance data.

2.2 PIPE LABELS

A. General Requirements for Manufactured Pipe Labels: Preprinted, color-coded, with lettering indicating service, and showing flow direction.

B. Pretensioned Pipe Labels: Precoiled, semirigid plastic formed to cover full circumference of pipe and to attach to pipe without fasteners or adhesive.

C. Pipe Label Contents: Include identification of piping service using same designations or abbreviations as used on Drawings, pipe size, and an arrow indicating flow direction.

1. Flow-Direction Arrows: Integral with piping system service lettering to accommodate both directions, or as separate unit on each pipe label to indicate flow direction.
2. Lettering Size: At least 1-1/2 inches high.

2.3 DUCT LABELS

A. Material and Thickness: Multilayer, multicolor, plastic labels for mechanical engraving, 1/8 inch thick, and having predrilled holes for attachment hardware.

B. Maximum Temperature: Able to withstand temperatures up to 160 deg F.

C. Minimum Label Size: Length and width vary for required label content, but not less than 2-1/2 by 3/4 inch.

D. Minimum Letter Size: 1/4 inch for name of units if viewing distance is less than 24 inches, 1/2 inch for viewing distances up to 72 inches, and proportionately larger lettering for greater viewing distances. Include secondary lettering two-thirds to three-fourths the size of principal lettering.

E. Adhesive: Contact-type permanent adhesive, compatible with label and with substrate.

F. Duct Label Contents: Include identification of duct service using same designations or abbreviations as used on Drawings, duct size, and an arrow indicating flow direction.

1. Flow-Direction Arrows: Integral with duct system service lettering to accommodate both directions, or as separate unit on each duct label to indicate flow direction.
2. Lettering Size: At least 1-1/2 inches high.

2.4 VALVE TAGS

A. Valve Tags: Stamped or engraved with 1/4-inch letters for piping system abbreviation and 1/2-inch numbers.

1. Tag Material: Brass, 0.032-inch minimum thickness, and having predrilled or stamped holes for attachment hardware.
2. Fasteners: Brass wire-link or beaded chain; or S-hook.

B. Valve Schedules: For each piping system, on 8-1/2-by-11-inch bond paper. Tabulate valve number, piping system, system abbreviation (as shown on valve tag), location of valve (room or space), normal-operating position (open, closed, or modulating), and variations for identification. Mark valves for emergency shutoff and similar special uses.

1. Valve-tag schedule shall be included in operation and maintenance data.

PART 3 - EXECUTION

3.1 PREPARATION

A. Clean piping and equipment surfaces of substances that could impair bond of identification devices, including dirt, oil, grease, release agents, and incompatible primers, paints, and encapsulants.

3.2 EQUIPMENT LABEL INSTALLATION

A. Install or permanently fasten labels on each major item of mechanical equipment.

B. Locate equipment labels where accessible and visible.

3.3 PIPE LABEL INSTALLATION

A. Piping Color-Coding: Painting of piping is specified in other sections.

B. Locate pipe labels where piping is exposed or above accessible ceilings in finished spaces; machine rooms; accessible maintenance spaces such as shafts, tunnels, and plenums; and exterior exposed locations as follows:

1. Near each valve and control device.
2. Near each branch connection, excluding short takeoffs for fixtures and terminal units. Where flow pattern is not obvious, mark each pipe at branch.
3. Near penetrations through walls, floors, ceilings, and inaccessible enclosures.

4. At access doors, manholes, and similar access points that permit view of concealed piping.
5. Near major equipment items and other points of origination and termination.
6. Spaced at maximum intervals of 50 feet along each run. Reduce intervals to 25 feet in areas of congested piping and equipment.
7. On piping above removable acoustical ceilings. Omit intermediately spaced labels.

C. Pipe Label Color Schedule:

1. Refrigerant Piping:

a. Background Color: Orange.
b. Letter Color: Black.

3.4 DUCT LABEL INSTALLATION

A. Install plastic-laminated duct labels with permanent adhesive on air ducts in the following color codes:

1. Blue: For cold-air supply ducts.
2. Yellow: For hot-air supply ducts.
3. Green: For exhaust-, outside-, relief-, return-, and mixed-air ducts.
4. ASME A13.1 Colors and Designs: For hazardous material exhaust.

B. Locate labels near points where ducts enter into concealed spaces and at maximum intervals of 50 feet in each space where ducts are exposed or concealed by removable ceiling system.

3.5 VALVE-TAG INSTALLATION

A. Install tags on valves and control devices in piping systems, except check valves; valves within factory-fabricated equipment units; shutoff valves; faucets; convenience and lawn-watering hose connections; and HVAC terminal devices and similar roughing-in connections of end-use fixtures and units. List tagged valves in a valve schedule.

B. Valve-Tag Application Schedule: Tag valves according to size, shape, and color scheme and with captions similar to those indicated in the following subparagraphs:

1. Valve-Tag Size and Shape:

a. All Valve-Tags: 1-1/2 inches minimum, round.

2. Valve-Tag Color:

a. All Valve-Tags: Natural.

3. Letter Color:
a. All Valve-Tags: Black.

END OF SECTION 230553

SECTION 23 05 93 - TESTING, ADJUSTING, AND BALANCING FOR HVAC

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section Includes:

1. Balancing Air Systems:

a. Constant-volume air systems.

1.3 DEFINITIONS

A. AABC: Associated Air Balance Council.

B. TAB: Testing, adjusting, and balancing.

C. TAB Specialist: An entity engaged to perform TAB Work.

1.4 INFORMATIONAL SUBMITTALS

A. Qualification Data: Within 30 days of Contractor's Notice to Proceed, submit documentation that the TAB contractor and this Project's TAB team members meet the qualifications specified in "Quality Assurance" Article.

B. Contract Documents Examination Report: Within 30 days of Contractor's Notice to Proceed, submit the Contract Documents review report as specified in Part 3.

C. Strategies and Procedures Plan: Within 30 days of Contractor's Notice to Proceed, submit TAB strategies and step-by-step procedures as specified in "Preparation" Article.

D. Certified TAB reports.

E. Sample report forms.

F. Instrument calibration reports, to include the following:

1. Instrument type and make.
2. Serial number.
3. Application.
4. Dates of use.
5. Dates of calibration.

1.5 QUALITY ASSURANCE

A. TAB Contractor Qualifications: Engage a TAB entity certified by AABC.

1. TAB Field Supervisor: Employee of the TAB contractor and certified by AABC.
2. TAB Technician: Employee of the TAB contractor and who is certified by AABC as a TAB technician.

B. TAB Conference: Meet with Owner on approval of the TAB strategies and procedures plan to develop a mutual understanding of the details. Require the participation of the TAB field supervisor and technicians. Provide seven days' advance notice of scheduled meeting time and location.

1. Agenda Items:

a. The Contract Documents examination report.
b. The TAB plan.
c. Coordination and cooperation of trades and subcontractors.
d. Coordination of documentation and communication flow.

C. Certify TAB field data reports and perform the following:

1. Review field data reports to validate accuracy of data and to prepare certified TAB reports.
2. Certify that the TAB team complied with the approved TAB plan and the procedures specified and referenced in this Specification.

D. TAB Report Forms: Use standard TAB contractor's forms approved by Architect.

E. Instrumentation Type, Quantity, Accuracy, and Calibration: As described in ASHRAE 111, Section 5, "Instrumentation."

F. ASHRAE Compliance: Applicable requirements in ASHRAE 62.1, Section 7.2.2 - "Air Balancing."

G. ASHRAE/IESNA Compliance: Applicable requirements in ASHRAE/IESNA 90.1, Section 6.7.2.3 - "System Balancing."

1.6 PROJECT CONDITIONS

A. Full Owner Occupancy: Owner will occupy the site and existing building during entire TAB period. Cooperate with Owner during TAB operations to minimize conflicts with Owner's operations.

1.7 COORDINATION

A. Notice: Provide seven days' advance notice for each test. Include scheduled test dates and times.

B. Perform TAB after leakage and pressure tests on air and water distribution systems have been satisfactorily completed.

PART 2 - PRODUCTS (Not Applicable)

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine the Contract Documents to become familiar with Project requirements and to discover conditions in systems' designs that may preclude proper TAB of systems and equipment.

B. Examine systems for installed balancing devices, such as test ports, gage cocks, thermometer wells, flow-control devices, balancing valves and fittings, and manual volume dampers. Verify that locations of these balancing devices are accessible.

C. Examine the approved submittals for HVAC systems and equipment.

D. Examine design data including HVAC system descriptions, statements of design assumptions for environmental conditions and systems' output, and statements of philosophies and assumptions about HVAC system and equipment controls.

E. Examine ceiling plenums and underfloor air plenums used for supply, return, or relief air to verify that they meet the leakage class of connected ducts as specified in Section 233113 "Metal Ducts" and are properly separated from adjacent areas. Verify that penetrations in plenum walls are sealed and fire-stopped if required.

F. Examine equipment performance data including fan curves.

1. Relate performance data to Project conditions and requirements, including system effects that can create undesired or unpredicted conditions that cause reduced capacities in all or part of a system.
2. Calculate system-effect factors to reduce performance ratings of HVAC equipment when installed under conditions different from the conditions used to rate equipment performance. To calculate system effects for air systems, use tables and charts found in AMCA 201, "Fans and Systems," or in SMACNA's "HVAC Systems - Duct Design." Compare results with the design data and installed conditions.

G. Examine system and equipment installations and verify that field quality-control testing, cleaning, and adjusting specified in individual Sections have been performed.

H. Examine test reports specified in individual system and equipment Sections.

I. Examine HVAC equipment and filters and verify that bearings are greased, belts are aligned and tight, and equipment with functioning controls is ready for operation.

J. Examine operating safety interlocks and controls on HVAC equipment.

K. Report deficiencies discovered before and during performance of TAB procedures. Observe and record system reactions to changes in conditions. Record default set points if different from indicated values.

3.2 PREPARATION

A. Prepare a TAB plan that includes strategies and step-by-step procedures.

B. Complete system-readiness checks and prepare reports. Verify the following:

1. Permanent electrical-power wiring is complete.
2. Automatic temperature-control systems are operational.
3. Equipment and duct access doors are securely closed.
4. Balance, smoke, and fire dampers are open.
5. Isolating and balancing valves are open and control valves are operational.
6. Ceilings are installed in critical areas where air-pattern adjustments are required and access to balancing devices is provided.
7. Windows and doors can be closed so indicated conditions for system operations can be met.

3.3 GENERAL PROCEDURES FOR TESTING AND BALANCING

A. Perform testing and balancing procedures on each system according to the procedures contained in AABC's "National Standards for Total System Balance", ASHRAE 111, and SMACNA's "HVAC Systems - Testing, Adjusting, and Balancing" and in this Section.

1. Comply with requirements in ASHRAE 62.1, Section 7.2.2 - "Air Balancing."

B. Cut insulation, ducts, pipes, and equipment cabinets for installation of test probes to the minimum extent necessary for TAB procedures.

1. After testing and balancing, patch probe holes in ducts with same material and thickness as used to construct ducts.
2. After testing and balancing, install test ports and duct access doors that comply with requirements in Section 233300 "Air Duct Accessories."
3. Install and join new insulation that matches removed materials. Restore insulation, coverings, vapor barrier, and finish according to Section 230713 "Duct Insulation" and Section 230719 "HVAC Piping Insulation."

C. Mark equipment and balancing devices, including damper-control positions, valve position indicators, fan-speed-control levers, and similar controls and devices, with paint or other suitable, permanent identification material to show final settings.

D. Take and report testing and balancing measurements in inch-pound (IP) units.

3.4 GENERAL PROCEDURES FOR BALANCING AIR SYSTEMS

A. Prepare test reports for both fans and outlets. Obtain manufacturer's outlet factors and recommended testing procedures. Crosscheck the summation of required outlet volumes with required fan volumes.

B. Prepare schematic diagrams of systems' "as-built" duct layouts.

C. For variable-air-volume systems, develop a plan to simulate diversity.

D. Determine the best locations in main and branch ducts for accurate duct-airflow measurements.

E. Check airflow patterns from the outdoor-air louvers and dampers and the return- and exhaust-air dampers through the supply-fan discharge and mixing dampers.

F. Locate start-stop and disconnect switches, electrical interlocks, and motor starters.

G. Verify that motor starters are equipped with properly sized thermal protection.

H. Check dampers for proper position to achieve desired airflow path.

I. Check for airflow blockages.

J. Check condensate drains for proper connections and functioning.

K. Check for proper sealing of air-handling-unit components.

L. Verify that air duct system is sealed as specified in Section 233113 "Metal Ducts."

3.5 PROCEDURES FOR CONSTANT-VOLUME AIR SYSTEMS

A. Adjust fans to deliver total indicated airflows within the maximum allowable fan speed listed by fan manufacturer.

1. Measure total airflow.

   a. Where sufficient space in ducts is unavailable for Pitot-tube traverse measurements, measure airflow at terminal outlets and inlets and calculate the total airflow.

2. Measure fan static pressures as follows to determine actual static pressure:

   a. Measure outlet static pressure as far downstream from the fan as practical and upstream from restrictions in ducts such as elbows and transitions.
   b. Measure static pressure directly at the fan outlet or through the flexible connection.
   c. Measure inlet static pressure of single-inlet fans in the inlet duct as near the fan as possible, upstream from the flexible connection, and downstream from duct restrictions.
   d. Measure inlet static pressure of double-inlet fans through the wall of the plenum that houses the fan.

3. Measure static pressure across each component that makes up an air-handling unit, rooftop unit, and other air-handling and -treating equipment.

   a. Report the cleanliness status of filters and the time static pressures are measured.

4. Measure static pressures entering and leaving other devices, such as sound traps, heat-recovery equipment, and air washers, under final balanced conditions.
5. Review Record Documents to determine variations in design static pressures versus actual static pressures. Calculate actual system-effect factors. Recommend adjustments to accommodate actual conditions.
6. Obtain approval from Architect for adjustment of fan speed higher or lower than indicated speed. Comply with requirements in HVAC Sections for air-handling units for adjustment of fans, belts, and pulley sizes to achieve indicated air-handling-unit performance.
7. Do not make fan-speed adjustments that result in motor overload. Consult equipment manufacturers about fan-speed safety factors. Modulate dampers and measure fan-motor amperage to ensure that no overload will occur. Measure amperage in full-cooling, full-heating, economizer, and any other operating mode to determine the maximum required brake horsepower.

B. Adjust volume dampers for main duct, submain ducts, and major branch ducts to indicated airflows within specified tolerances.

1. Measure airflow of submain and branch ducts.

a. Where sufficient space in submain and branch ducts is unavailable for Pitot-tube traverse measurements, measure airflow at terminal outlets and inlets and calculate the total airflow for that zone.

2. Measure static pressure at a point downstream from the balancing damper, and adjust volume dampers until the proper static pressure is achieved.
3. Remeasure each submain and branch duct after all have been adjusted. Continue to adjust submain and branch ducts to indicated airflows within specified tolerances.

C. Measure air outlets and inlets without making adjustments.

1. Measure terminal outlets using a direct-reading hood or outlet manufacturer's written instructions and calculating factors.

D. Adjust air outlets and inlets for each space to indicated airflows within specified tolerances of indicated values. Make adjustments using branch volume dampers rather than extractors and the dampers at air terminals.

1. Adjust each outlet in same room or space to within specified tolerances of indicated quantities without generating noise levels above the limitations prescribed by the Contract Documents.
2. Adjust patterns of adjustable outlets for proper distribution without drafts.

3.6 TOLERANCES

A. Set HVAC system's air flow rates and water flow rates within the following tolerances:

1. Supply, Return, and Exhaust Fans and Equipment with Fans: Plus or minus 10 percent.
2. Air Outlets and Inlets: Plus or minus 10 percent.

3.7 REPORTING

A. Initial Construction-Phase Report: Based on examination of the Contract Documents as specified in "Examination" Article, prepare a report on the adequacy of design for systems' balancing devices. Recommend changes and additions to systems' balancing devices to facilitate proper performance measuring and balancing. Recommend changes and additions to HVAC systems and general construction to allow access for performance measuring and balancing devices.

3.8 FINAL REPORT

A. General: Prepare a certified written report; tabulate and divide the report into separate sections for tested systems and balanced systems.

1. Include a certification sheet at the front of the report's binder, signed and sealed by the certified testing and balancing engineer.
2. Include a list of instruments used for procedures, along with proof of calibration.

B. Final Report Contents: In addition to certified field-report data, include the following:

1. Fan curves.
2. Manufacturers' test data.
3. Field test reports prepared by system and equipment installers.
4. Other information relative to equipment performance; do not include Shop Drawings and product data.

C. General Report Data: In addition to form titles and entries, include the following data:

1. Title page.
2. Name and address of the TAB contractor.
3. Project name.
4. Project location.
5. Architect's name and address.
6. Engineer's name and address.
7. Contractor's name and address.
8. Report date.
9. Signature of TAB supervisor who certifies the report.
10. Table of Contents with the total number of pages defined for each section of the report. Number each page in the report.
11. Summary of contents including the following:

    a. Indicated versus final performance.
    b. Notable characteristics of systems.
    c. Description of system operation sequence if it varies from the Contract Documents.

12. Nomenclature sheets for each item of equipment.
13. Data for terminal units, including manufacturer's name, type, size, and fittings.
14. Notes to explain why certain final data in the body of reports vary from indicated values.
15. Test conditions for fans and pump performance forms including the following:

    a. Settings for outdoor-, return-, and exhaust-air dampers.
    b. Conditions of filters.
    c. Cooling coil, wet- and dry-bulb conditions.
    d. Face and bypass damper settings at coils.
    e. Fan drive settings including settings and percentage of maximum pitch diameter.
    f. Inlet vane settings for variable-air-volume systems.
    g. Settings for supply-air, static-pressure controller.
    h. Other system operating conditions that affect performance.

D. System Diagrams: Include schematic layouts of air and hydronic distribution systems. Present each system with single-line diagram and include the following:

1. Quantities of outdoor, supply, return, and exhaust airflows.
2. Water and steam flow rates.
3. Duct, outlet, and inlet sizes.
4. Pipe and valve sizes and locations.
5. Terminal units.
6. Balancing stations.
7. Position of balancing devices.

E. Air-Handling-Unit Test Reports: For air-handling units with coils, include the following:

1. Unit Data:

    a. Unit identification.
    b. Location.
    c. Make and type.
    d. Model number and unit size.
    e. Manufacturer's serial number.
    f. Unit arrangement and class.
    g. Discharge arrangement.
    h. Sheave make, size in inches, and bore.
    i. Center-to-center dimensions of sheave, and amount of adjustments in inches.
    j. Number, make, and size of belts.
    k. Number, type, and size of filters.

2. Motor Data:

    a. Motor make, and frame type and size.
    b. Horsepower and rpm.
    c. Volts, phase, and hertz.
    d. Full-load amperage and service factor.
    e. Sheave make, size in inches, and bore.
    f. Center-to-center dimensions of sheave, and amount of adjustments in inches.

3. Test Data (Indicated and Actual Values):

    a. Total air flow rate in cfm.
    b. Total system static pressure in inches wg.
    c. Fan rpm.
    d. Discharge static pressure in inches wg.
    e. Filter static-pressure differential in inches wg.
    f. Preheat-coil static-pressure differential in inches wg.
    g. Cooling-coil static-pressure differential in inches wg.
    h. Heating-coil static-pressure differential in inches wg.
    i. Outdoor airflow in cfm.
    j. Return airflow in cfm.
    k. Outdoor-air damper position.
    l. Return-air damper position.
    m. Vortex damper position.

F. Fan Test Reports: For supply, return, and exhaust fans, include the following:

1. Fan Data:

    a. System identification.
    b. Location.
    c. Make and type.
    d. Model number and size.
    e. Manufacturer's serial number.
    f. Arrangement and class.
    g. Sheave make, size in inches, and bore.
    h. Center-to-center dimensions of sheave, and amount of adjustments in inches.

2. Motor Data:

    a. Motor make, and frame type and size.

b. Horsepower and rpm.
c. Volts, phase, and hertz.
d. Full-load amperage and service factor.
e. Sheave make, size in inches, and bore.
f. Center-to-center dimensions of sheave, and amount of adjustments in inches.
g. Number, make, and size of belts.

3. Test Data (Indicated and Actual Values):

a. Total airflow rate in cfm.
b. Total system static pressure in inches wg.
c. Fan rpm.
d. Discharge static pressure in inches wg.
e. Suction static pressure in inches wg.

G. Round, Flat-Oval, and Rectangular Duct Traverse Reports: Include a diagram with a grid representing the duct cross-section and record the following:

1. Report Data:

a. System and air-handling-unit number.
b. Location and zone.
c. Traverse air temperature in deg F.
d. Duct static pressure in inches wg.
e. Duct size in inches.
f. Duct area in sq. ft..
g. Indicated air flow rate in cfm.
h. Indicated velocity in fpm.
i. Actual air flow rate in cfm.
j. Actual average velocity in fpm.
k. Barometric pressure in psig.

H. Instrument Calibration Reports:

1. Report Data:

a. Instrument type and make.
b. Serial number.
c. Application.
d. Dates of use.
e. Dates of calibration.

3.9 INSPECTIONS

A. Initial Inspection:

1. After testing and balancing are complete, operate each system and randomly check measurements to verify that the system is operating according to the final test and balance readings documented in the final report.
2. Check the following for each system:

a. Measure airflow of at least 10 percent of air outlets.
b. Measure room temperature at each thermostat/temperature sensor. Compare the reading to the set point.

c. Verify that balancing devices are marked with final balance position.
d. Note deviations from the Contract Documents in the final report.

B. Final Inspection:

1. After initial inspection is complete and documentation by random checks verifies that testing and balancing are complete and accurately documented in the final report, request that a final inspection be made by Architect.
2. The TAB contractor's test and balance engineer shall conduct the inspection in the presence of Owner.
3. Owner shall randomly select measurements, documented in the final report, to be rechecked. Rechecking shall be limited to either 10 percent of the total measurements recorded or the extent of measurements that can be accomplished in a normal 8-hour business day.
4. If rechecks yield measurements that differ from the measurements documented in the final report by more than the tolerances allowed, the measurements shall be noted as "FAILED."
5. If the number of "FAILED" measurements is greater than 10 percent of the total measurements checked during the final inspection, the testing and balancing shall be considered incomplete and shall be rejected.

C. TAB Work will be considered defective if it does not pass final inspections. If TAB Work fails, proceed as follows:

1. Recheck all measurements and make adjustments. Revise the final report and balancing device settings to include all changes; resubmit the final report and request a second final inspection.
2. If the second final inspection also fails, Owner may contract the services of another TAB contractor to complete TAB Work according to the Contract Documents and deduct the cost of the services from the original TAB contractor's final payment.

D. Prepare test and inspection reports.

3.10 ADDITIONAL TESTS

A. Within 90 days of completing TAB, perform additional TAB to verify that balanced conditions are being maintained throughout and to correct unusual conditions.

B. Seasonal Periods: If initial TAB procedures were not performed during near-peak summer and winter conditions, perform additional TAB during near-peak summer and winter conditions.

END OF SECTION 230593

SECTION 23 07 13 - DUCT INSULATION

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section includes insulating the following duct services:

1. Indoor, concealed supply and outdoor air.
2. Indoor, exposed supply and outdoor air.
3. Indoor, concealed return located in unconditioned space.
4. Indoor, exposed return located in unconditioned space.
5. Indoor, exposed exhaust between isolation damper and penetration of building exterior.
6. Outdoor, concealed supply and return.
7. Outdoor, exposed supply and return.

B. Related Sections:

1. Section 230719 "HVAC Piping Insulation."
2. Section 233113 "Metal Ducts" for duct liners.

1.3 ACTION SUBMITTALS

A. Product Data: For each type of product indicated. Include thermal conductivity, water-vapor permeance thickness, and jackets (both factory- and field-applied if any).

B. Shop Drawings: Include plans, elevations, sections, details, and attachments to other work.

1. Detail application of protective shields, saddles, and inserts at hangers for each type of insulation and hanger.
2. Detail insulation application at elbows, fittings, dampers, specialties and flanges for each type of insulation.
3. Detail application of field-applied jackets.
4. Detail application at linkages of control devices.

C. Samples: For each type of insulation and jacket indicated. Identify each Sample, describing product and intended use. Sample sizes are as follows:

1. Sheet Form Insulation Materials: 12 inches square.
2. Sheet Jacket Materials: 12 inches square.
3. Manufacturer's Color Charts: For products where color is specified, show the full range of colors available for each type of finish material.

1.4 INFORMATIONAL SUBMITTALS

A. Qualification Data: For qualified Installer.

B. Material Test Reports: From a qualified testing agency acceptable to authorities having jurisdiction indicating, interpreting, and certifying test results for compliance of insulation materials, sealers, attachments, cements, and jackets, with requirements indicated. Include dates of tests and test methods employed.

C. Field quality-control reports.

1.5 QUALITY ASSURANCE

A. Installer Qualifications: Skilled mechanics who have successfully completed an apprenticeship program or another craft training program certified by the Department of Labor, Bureau of Apprenticeship and Training.

B. Surface-Burning Characteristics: For insulation and related materials, as determined by testing identical products according to ASTM E 84, by a testing agency acceptable to authorities having jurisdiction. Factory label insulation and jacket materials and adhesive, mastic, tapes, and cement material containers, with appropriate markings of applicable testing agency.

1. Insulation Installed Indoors: Flame-spread index of 25 or less, and smoke-developed index of 50 or less.
2. Insulation Installed Outdoors: Flame-spread index of 75 or less, and smoke-developed index of 150 or less.

1.6 DELIVERY, STORAGE, AND HANDLING

A. Packaging: Insulation material containers shall be marked by manufacturer with appropriate ASTM standard designation, type and grade, and maximum use temperature.

1.7 COORDINATION

A. Coordinate sizes and locations of supports, hangers, and insulation shields specified in Section 230529 "Hangers and Supports for HVAC Piping and Equipment."

B. Coordinate clearance requirements with duct Installer for duct insulation application. Before preparing ductwork Shop Drawings, establish and maintain clearance requirements for installation of insulation and field-applied jackets and finishes and for space required for maintenance.

C. Coordinate installation and testing of heat tracing.

1.8 SCHEDULING

A. Schedule insulation application after pressure testing systems and, where required, after installing and testing heat tracing. Insulation application may begin on segments that have satisfactory test results.

B. Complete installation and concealment of plastic materials as rapidly as possible in each area of construction.

PART 2 - PRODUCTS

2.1 INSULATION MATERIALS

A. Comply with requirements in "Duct Insulation Schedule, General," "Indoor Duct and Plenum Insulation Schedule," and "Aboveground, Outdoor Duct and Plenum Insulation Schedule" articles for where insulating materials shall be applied.

B. Products shall not contain asbestos, lead, mercury, or mercury compounds.

C. Products that come in contact with stainless steel shall have a leachable chloride content of less than 50 ppm when tested according to ASTM C 871.

D. Insulation materials for use on austenitic stainless steel shall be qualified as acceptable according to ASTM C 795.

E. Foam insulation materials shall not use CFC or HCFC blowing agents in the manufacturing process.

F. Mineral-Fiber Blanket Insulation: Mineral or glass fibers bonded with a thermosetting resin. Comply with ASTM C 553, Type II and ASTM C 1290, Type III with factory-applied FSK jacket. Factory-applied jacket requirements are specified in "Factory-Applied Jackets" Article.

1. Products: Subject to compliance with requirements, provide one of the following:

a. CertainTeed Corp.; SoftTouch Duct Wrap.
b. Johns Manville; Microlite.
c. Knauf Insulation; Friendly Feel Duct Wrap.
d. Owens Corning; SOFTR All-Service Duct Wrap.

G. Mineral-Fiber Board Insulation: Mineral or glass fibers bonded with a thermosetting resin. Comply with ASTM C 612, Type IA or Type IB. For duct and plenum applications, provide insulation with factory-applied FSK jacket. Factory-applied jacket requirements are specified in "Factory-Applied Jackets" Article.

1. Products: Subject to compliance with requirements, provide one of the following:

a. CertainTeed Corp.; Commercial Board.
b. Fibrex Insulations Inc.; FBX.
c. Johns Manville; 800 Series Spin-Glas.
d. Knauf Insulation; Insulation Board.
e. Manson Insulation Inc.; AK Board.
f. Owens Corning; Fiberglas 700 Series.

H. Mineral-Fiber, Pipe and Tank Insulation: Mineral or glass fibers bonded with a thermosetting resin. Semirigid board material with factory-applied [FSK jacket] complying with ASTM C 1393, Type II or Type IIIA Category 2, or with properties similar to ASTM C 612, Type IB. Nominal density is 2.5 lb/cu. ft. or more. Thermal conductivity (k-value) at 100 deg F is 0.29 Btu x in./h x sq. ft. x deg F or less. Factory-applied jacket requirements are specified in "Factory-Applied Jackets" Article.

1. Products: Subject to compliance with requirements, provide one of the following:

    a. CertainTeed Corp.; CrimpWrap.
    b. Johns Manville; MicroFlex.
    c. Knauf Insulation; Pipe and Tank Insulation.
    d. Manson Insulation Inc.; AK Flex.
    e. Owens Corning; Fiberglas Pipe and Tank Insulation.

2.2 ADHESIVES

A. Materials shall be compatible with insulation materials, jackets, and substrates and for bonding insulation to itself and to surfaces to be insulated unless otherwise indicated.

B. Mineral-Fiber Adhesive: Comply with MIL-A-3316C, Class 2, Grade A.

1. Products: Subject to compliance with requirements, provide one of the following:

    a. Childers Brand, Specialty Construction Brands, Inc., a business of H. B. Fuller Company; CP-127.Eagle Bridges - Marathon Industries; 225.
    b. Foster Brand, Specialty Construction Brands, Inc., a business of H. B. Fuller Company; 85-60/85-70.Mon-Eco Industries, Inc.; 22-25.

2. For indoor applications, adhesive shall have a VOC content of 80 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).
3. Adhesive shall comply with the testing and product requirements of the California Department of Health Services' "Standard Practice for the Testing of Volatile Organic Emissions from Various Sources Using Small-Scale Environmental Chambers."

C. ASJ Adhesive, and FSK Jacket Adhesive: Comply with MIL-A-3316C, Class 2, Grade A for bonding insulation jacket lap seams and joints.

1. Products: Subject to compliance with requirements, provide one of the following:

    a. Childers Brand, Specialty Construction Brands, Inc., a business of H. B. Fuller Company; CP-82.
    b. Eagle Bridges - Marathon Industries; 225.
    c. Foster Brand, Specialty Construction Brands, Inc., a business of H. B. Fuller Company; 85-50.Mon-Eco Industries, Inc.; 22-25.

2. For indoor applications, adhesive shall have a VOC content of 50 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).
3. Adhesive shall comply with the testing and product requirements of the California Department of Health Services' "Standard Practice for the Testing of Volatile Organic Emissions from Various Sources Using Small-Scale Environmental Chambers."

2.3 MASTICS

A. Materials shall be compatible with insulation materials, jackets, and substrates; comply with MIL-PRF-19565C, Type II.

1. For indoor applications, use mastics that have a VOC content of 50 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).

B. Vapor-Barrier Mastic: Water based; suitable for indoor use on below ambient services.

1. Products: Subject to compliance with requirements, provide one of the following:

   a. Foster Brand, Specialty Construction Brands, Inc., a business of H. B. Fuller Company; 30-80/30-90.
   b. Vimasco Corporation; 749.

2. Water-Vapor Permeance: ASTM E 96/E 96M, Procedure B, 0.013 perm at 43-mil dry film thickness.
3. Service Temperature Range: Minus 20 to plus 180 deg F.
4. Solids Content: ASTM D 1644, 58 percent by volume and 70 percent by weight.
5. Color: White.

C. Breather Mastic: Water based; suitable for indoor and outdoor use on above ambient services.

1. Products: Subject to compliance with requirements, provide one of the following:

   a. Childers Brand, Specialty Construction Brands, Inc., a business of H. B. Fuller Company; CP-10.
   b. Eagle Bridges - Marathon Industries; 550.
   c. Foster Brand, Specialty Construction Brands, Inc., a business of H. B. Fuller Company; 46-50.
   d. Mon-Eco Industries, Inc.; 55-50.
   e. Vimasco Corporation; WC-1/WC-5.

2. Water-Vapor Permeance: ASTM F 1249, 1.8 perms at 0.0625-inch dry film thickness.
3. Service Temperature Range: Minus 20 to plus 180 deg F.
4. Solids Content: 60 percent by volume and 66 percent by weight.
5. Color: White.

2.4 LAGGING ADHESIVES

A. Description: Comply with MIL-A-3316C, Class I, Grade A and shall be compatible with insulation materials, jackets, and substrates.

1. For indoor applications, use lagging adhesives that have a VOC content of 50 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).

2. Products: Subject to compliance with requirements, provide one of the following:

   a. Childers Brand, Specialty Construction Brands, Inc., a business of H. B. Fuller Company; CP-50 AHV2.Foster Brand, Specialty Construction Brands, Inc., a business of H. B. Fuller Company; 30-36.
   b. Vimasco Corporation; 713 and 714.

3. Fire-resistant, water-based lagging adhesive and coating for use indoors to adhere fire-resistant lagging cloths over duct insulation.
4. Service Temperature Range: 0 to plus 180 deg F.
5. Color: White.

2.5 SEALANTS

A. FSK and Metal Jacket Flashing Sealants:

1. Products: Subject to compliance with requirements, provide one of the following:

   a. Childers Brand, Specialty Construction Brands, Inc., a business of H. B. Fuller Company; CP-76.Eagle Bridges - Marathon Industries; 405.
   b. Foster Brand, Specialty Construction Brands, Inc., a business of H. B. Fuller Company; 95-44.
   c. Mon-Eco Industries, Inc.; 44-05.

2. Materials shall be compatible with insulation materials, jackets, and substrates.
3. Fire- and water-resistant, flexible, elastomeric sealant.
4. Service Temperature Range: Minus 40 to plus 250 deg F.
5. Color: Aluminum.
6. For indoor applications, sealants shall have a VOC content of 420 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).
7. Sealants shall comply with the testing and product requirements of the California Department of Health Services' "Standard Practice for the Testing of Volatile Organic Emissions from Various Sources Using Small-Scale Environmental Chambers."

2.6 FACTORY-APPLIED JACKETS

A. Insulation system schedules indicate factory-applied jackets on various applications. When factory-applied jackets are indicated, comply with the following:

1. FSK Jacket: Aluminum-foil, fiberglass-reinforced scrim with kraft-paper backing; complying with ASTM C 1136, Type II.

2.7 FIELD-APPLIED JACKETS

A. Field-applied jackets shall comply with ASTM C 921, Type I, unless otherwise indicated.

B. FSK Jacket: Aluminum-foil-face, fiberglass-reinforced scrim with kraft-paper backing.

2.8 TAPES

A. FSK Tape: Foil-face, vapor-retarder tape matching factory-applied jacket with acrylic adhesive; complying with ASTM C 1136.

1. Products: Subject to compliance with requirements, provide one of the following:

   a. ABI, Ideal Tape Division; 491 AWF FSK.
   b. Avery Dennison Corporation, Specialty Tapes Division; Fasson 0827.
   c. Compac Corporation; 110 and 111.
   d. Venture Tape; 1525 CW NT, 1528 CW, and 1528 CW/SQ.

2. Width: 3 inches.
3. Thickness: 6.5 mils.
4. Adhesion: 90 ounces force/inch in width.
5. Elongation: 2 percent.

6. Tensile Strength: 40 lbf/inch in width.
7. FSK Tape Disks and Squares: Precut disks or squares of FSK tape.

2.9 SECUREMENTS

A. Bands:

1. Products: Subject to compliance with requirements, provide one of the following:

   a. ITW Insulation Systems; Gerrard Strapping and Seals.
   b. RPR Products, Inc.; Insul-Mate Strapping, Seals, and Springs.

2. Stainless Steel: ASTM A 167 or ASTM A 240/A 240M, Type 304; 0.015-inch-thick, 1/2 inch wide with wing seal or closed seal.
3. Springs: Twin spring set constructed of stainless steel with ends flat and slotted to accept metal bands. Spring size determined by manufacturer for application.

B. Insulation Pins and Hangers:

1. Cupped-Head, Capacitor-Discharge-Weld Pins: Copper- or zinc-coated steel pin, fully annealed for capacitor-discharge welding, 0.135-inch-diameter shank, length to suit depth of insulation indicated with integral 1-1/2-inch galvanized carbon-steel washer.

   a. Products: Subject to compliance with requirements, provide one of the following:

      1) AGM Industries, Inc.; CHP-1.
      2) GEMCO; Cupped Head Weld Pin.
      3) Midwest Fasteners, Inc.; Cupped Head.
      4) Nelson Stud Welding; CHP.

2. Insulation-Retaining Washers: Self-locking washers formed from 0.016-inch- thick, galvanized-steel sheet, with beveled edge sized as required to hold insulation securely in place but not less than 1-1/2 inches in diameter.

   a. Products: Subject to compliance with requirements, provide one of the following:

      1) AGM Industries, Inc.; RC-150.
      2) GEMCO; R-150.
      3) Midwest Fasteners, Inc.; WA-150.
      4) Nelson Stud Welding; Speed Clips.

   b. Protect ends with capped self-locking washers incorporating a spring steel insert to ensure permanent retention of cap in exposed locations.

3. Nonmetal Insulation-Retaining Washers: Self-locking washers formed from 0.016-inch-thick nylon sheet, with beveled edge sized as required to hold insulation securely in place but not less than 1-1/2 inches in diameter.

   a. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

      1) GEMCO.
      2) Midwest Fasteners, Inc.

C. Staples: Outward-clinching insulation staples, nominal 3/4-inch- wide, stainless steel or Monel.

D. Wire: 0.062-inch soft-annealed, galvanized steel.

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

a. C & F Wire.

2.10 CORNER ANGLES

A. Aluminum Corner Angles: 0.040 inch thick, minimum 1 by 1 inch, aluminum according to ASTM B 209, Alloy 3003, 3005, 3105, or 5005; Temper H-14.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates and conditions for compliance with requirements for installation tolerances and other conditions affecting performance of insulation application.

1. Verify that systems to be insulated have been tested and are free of defects.
2. Verify that surfaces to be insulated are clean and dry.

B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

A. Surface Preparation: Clean and dry surfaces to receive insulation. Remove materials that will adversely affect insulation application.

3.3 GENERAL INSTALLATION REQUIREMENTS

A. Install insulation materials, accessories, and finishes with smooth, straight, and even surfaces; free of voids throughout the length of ducts and fittings.

B. Install insulation materials, vapor barriers or retarders, jackets, and thicknesses required for each item of duct system as specified in insulation system schedules.

C. Install accessories compatible with insulation materials and suitable for the service. Install accessories that do not corrode, soften, or otherwise attack insulation or jacket in either wet or dry state.

D. Install insulation with longitudinal seams at top and bottom of horizontal runs.

E. Install multiple layers of insulation with longitudinal and end seams staggered.

F. Keep insulation materials dry during application and finishing.

G. Install insulation with tight longitudinal seams and end joints. Bond seams and joints with adhesive recommended by insulation material manufacturer.

H. Install insulation with least number of joints practical.

I. Where vapor barrier is indicated, seal joints, seams, and penetrations in insulation at hangers, supports, anchors, and other projections with vapor-barrier mastic.

1. Install insulation continuously through hangers and around anchor attachments.
2. For insulation application where vapor barriers are indicated, extend insulation on anchor legs from point of attachment to supported item to point of attachment to structure. Taper and seal ends at attachment to structure with vapor-barrier mastic.
3. Install insert materials and install insulation to tightly join the insert. Seal insulation to insulation inserts with adhesive or sealing compound recommended by insulation material manufacturer.

J. Apply adhesives, mastics, and sealants at manufacturer's recommended coverage rate and wet and dry film thicknesses.

K. Install insulation with factory-applied jackets as follows:

1. Draw jacket tight and smooth.
2. Cover circumferential joints with 3-inch- wide strips, of same material as insulation jacket. Secure strips with adhesive and outward clinching staples along both edges of strip, spaced 4 inches o.c.
3. Overlap jacket longitudinal seams at least 1-1/2 inches. Clean and dry surface to receive self-sealing lap. Staple laps with outward clinching staples along edge at 2 inches o.c.

   a. For below ambient services, apply vapor-barrier mastic over staples.

4. Cover joints and seams with tape, according to insulation material manufacturer's written instructions, to maintain vapor seal.
5. Where vapor barriers are indicated, apply vapor-barrier mastic on seams and joints and at ends adjacent to duct flanges and fittings.

L. Cut insulation in a manner to avoid compressing insulation more than 75 percent of its nominal thickness.

M. Finish installation with systems at operating conditions. Repair joint separations and cracking due to thermal movement.

N. Repair damaged insulation facings by applying same facing material over damaged areas. Extend patches at least 4 inches beyond damaged areas. Adhere, staple, and seal patches similar to butt joints.

3.4 PENETRATIONS

A. Insulation Installation at Roof Penetrations: Install insulation continuously through roof penetrations.

1. Seal penetrations with flashing sealant.
2. For applications requiring only indoor insulation, terminate insulation above roof surface and seal with joint sealant. For applications requiring indoor and outdoor insulation,

install insulation for outdoor applications tightly joined to indoor insulation ends. Seal joint with joint sealant.
3. Extend jacket of outdoor insulation outside roof flashing at least 2 inches below top of roof flashing.
4. Seal jacket to roof flashing with flashing sealant.

B. Insulation Installation at Aboveground Exterior Wall Penetrations: Install insulation continuously through wall penetrations.

1. Seal penetrations with flashing sealant.
2. For applications requiring only indoor insulation, terminate insulation inside wall surface and seal with joint sealant. For applications requiring indoor and outdoor insulation, install insulation for outdoor applications tightly joined to indoor insulation ends. Seal joint with joint sealant.
3. Extend jacket of outdoor insulation outside wall flashing and overlap wall flashing at least 2 inches.
4. Seal jacket to wall flashing with flashing sealant.

C. Insulation Installation at Interior Wall and Partition Penetrations (That Are Not Fire Rated): Install insulation continuously through walls and partitions.

D. Insulation Installation at Fire-Rated Wall and Partition Penetrations: Terminate insulation at fire damper sleeves for fire-rated wall and partition penetrations. Externally insulate damper sleeves to match adjacent insulation and overlap duct insulation at least 2 inches.

1. Comply with requirements in Section 078413 "Penetration Firestopping"irestopping and fire-resistive joint sealers.

E. Insulation Installation at Floor Penetrations:

1. Duct: For penetrations through fire-rated assemblies, terminate insulation at fire damper sleeves and externally insulate damper sleeve beyond floor to match adjacent duct insulation. Overlap damper sleeve and duct insulation at least 2 inches.
2. Seal penetrations through fire-rated assemblies. Comply with requirements in Section 078413 "Penetration Firestopping."

3.5 INSTALLATION OF MINERAL-FIBER INSULATION

A. Blanket Insulation Installation on Ducts and Plenums: Secure with adhesive and insulation pins.

1. Apply adhesives according to manufacturer's recommended coverage rates per unit area, for 100 percent coverage of duct and plenum surfaces.
2. Apply adhesive to entire circumference of ducts and to all surfaces of fittings and transitions.
3. Install either capacitor-discharge-weld pins and speed washers or cupped-head, capacitor-discharge-weld pins on sides and bottom of horizontal ducts and sides of vertical ducts as follows:

a. On duct sides with dimensions 18 inches and smaller, place pins along longitudinal centerline of duct. Space 3 inches maximum from insulation end joints, and 16 inches o.c.
b. On duct sides with dimensions larger than 18 inches, place pins 16 inches o.c. each way, and 3 inches maximum from insulation joints. Install additional pins to hold insulation tightly against surface at cross bracing.

c. Pins may be omitted from top surface of horizontal, rectangular ducts and plenums.
d. Do not overcompress insulation during installation.
e. Impale insulation over pins and attach speed washers.
f. Cut excess portion of pins extending beyond speed washers or bend parallel with insulation surface. Cover exposed pins and washers with tape matching insulation facing.

4. For ducts and plenums with surface temperatures below ambient, install a continuous unbroken vapor barrier. Create a facing lap for longitudinal seams and end joints with insulation by removing 2 inches from one edge and one end of insulation segment. Secure laps to adjacent insulation section with 1/2-inch outward-clinching staples, 1 inch o.c. Install vapor barrier consisting of factory- or field-applied jacket, adhesive, vapor-barrier mastic, and sealant at joints, seams, and protrusions.

   a. Repair punctures, tears, and penetrations with tape or mastic to maintain vapor-barrier seal.
   b. Install vapor stops for ductwork and plenums operating below 50 deg F at 18-foot intervals. Vapor stops shall consist of vapor-barrier mastic applied in a Z-shaped pattern over insulation face, along butt end of insulation, and over the surface. Cover insulation face and surface to be insulated a width equal to two times the insulation thickness, but not less than 3 inches.

5. Overlap unfaced blankets a minimum of 2 inches on longitudinal seams and end joints. At end joints, secure with steel bands spaced a maximum of 18 inches o.c.
6. Install insulation on rectangular duct elbows and transitions with a full insulation section for each surface. Install insulation on round and flat-oval duct elbows with individually mitered gores cut to fit the elbow.
7. Insulate duct stiffeners, hangers, and flanges that protrude beyond insulation surface with 6-inch- wide strips of same material used to insulate duct. Secure on alternating sides of stiffener, hanger, and flange with pins spaced 6 inches o.c.

B. Board Insulation Installation on Ducts and Plenums: Secure with adhesive and insulation pins.

1. Apply adhesives according to manufacturer's recommended coverage rates per unit area, for 100 percent coverage of duct and plenum surfaces.
2. Apply adhesive to entire circumference of ducts and to all surfaces of fittings and transitions.
3. Install either capacitor-discharge-weld pins and speed washers or cupped-head, capacitor-discharge-weld pins on sides and bottom of horizontal ducts and sides of vertical ducts as follows:

   a. On duct sides with dimensions 18 inches and smaller, place pins along longitudinal centerline of duct. Space 3 inches maximum from insulation end joints, and 16 inches o.c.
   b. On duct sides with dimensions larger than 18 inches, space pins 16 inches o.c. each way, and 3 inches maximum from insulation joints. Install additional pins to hold insulation tightly against surface at cross bracing.
   c. Pins may be omitted from top surface of horizontal, rectangular ducts and plenums.
   d. Do not overcompress insulation during installation.
   e. Cut excess portion of pins extending beyond speed washers or bend parallel with insulation surface. Cover exposed pins and washers with tape matching insulation facing.

4. For ducts and plenums with surface temperatures below ambient, install a continuous unbroken vapor barrier. Create a facing lap for longitudinal seams and end joints with insulation by removing 2 inches from one edge and one end of insulation segment. Secure laps to adjacent insulation section with 1/2-inch outward-clinching staples, 1 inch o.c. Install vapor barrier consisting of factory- or field-applied jacket, adhesive, vapor-barrier mastic, and sealant at joints, seams, and protrusions.

    a. Repair punctures, tears, and penetrations with tape or mastic to maintain vapor-barrier seal.
    b. Install vapor stops for ductwork and plenums operating below 50 deg F at 18-foot intervals. Vapor stops shall consist of vapor-barrier mastic applied in a Z-shaped pattern over insulation face, along butt end of insulation, and over the surface. Cover insulation face and surface to be insulated a width equal to two times the insulation thickness, but not less than 3 inches.

5. Install insulation on rectangular duct elbows and transitions with a full insulation section for each surface. Groove and score insulation to fit as closely as possible to outside and inside radius of elbows. Install insulation on round and flat-oval duct elbows with individually mitered gores cut to fit the elbow.
6. Insulate duct stiffeners, hangers, and flanges that protrude beyond insulation surface with 6-inch- wide strips of same material used to insulate duct. Secure on alternating sides of stiffener, hanger, and flange with pins spaced 6 inches o.c.

3.6 FIELD-APPLIED JACKET INSTALLATION

A. Where FSK jackets are indicated, install as follows:

1. Draw jacket material smooth and tight.
2. Install lap or joint strips with same material as jacket.
3. Secure jacket to insulation with manufacturer's recommended adhesive.
4. Install jacket with 1-1/2-inch laps at longitudinal seams and 3-inch- wide joint strips at end joints.
5. Seal openings, punctures, and breaks in vapor-retarder jackets and exposed insulation with vapor-barrier mastic.

B. Where metal jackets are indicated, install with 2-inch overlap at longitudinal seams and end joints. Overlap longitudinal seams arranged to shed water. Seal end joints with weatherproof sealant recommended by insulation manufacturer. Secure jacket with stainless-steel bands 12 inches o.c. and at end joints.

3.7 FINISHES

A. Insulation with ASJ, Glass-Cloth, or Other Paintable Jacket Material: Paint jacket with paint system identified below and as specified in Section 099113 "Exterior Painting" and Section 099123 "Interior Painting."

1. Flat Acrylic Finish: Two finish coats over a primer that is compatible with jacket material and finish coat paint. Add fungicidal agent to render fabric mildew proof.

    a. Finish Coat Material: Interior, flat, latex-emulsion size.

B. Flexible Elastomeric Thermal Insulation: After adhesive has fully cured, apply two coats of insulation manufacturer's recommended protective coating.

C. Color: Final color as selected by Architect. Vary first and second coats to allow visual inspection of the completed Work.

D. Do not field paint aluminum or stainless-steel jackets.

3.8 FIELD QUALITY CONTROL

A. Testing Agency: Engage a qualified testing agency to perform tests and inspections.

B. Perform tests and inspections.

C. Tests and Inspections:

1. Inspect ductwork, randomly selected by Architect, by removing field-applied jacket and insulation in layers in reverse order of their installation. Extent of inspection shall be limited to one location for each duct system defined in the "Duct Insulation Schedule, General" Article.

D. All insulation applications will be considered defective Work if sample inspection reveals noncompliance with requirements.

3.9 DUCT INSULATION SCHEDULE, GENERAL

A. Plenums and Ducts Requiring Insulation:

1. Indoor, concealed supply and outdoor air.
2. Indoor, exposed supply and outdoor air.
3. Indoor, concealed return located in unconditioned space.
4. Indoor, exposed return located in unconditioned space.
5. Outdoor, concealed supply and return.
6. Outdoor, exposed supply and return.

B. Items Not Insulated:

1. Fibrous-glass ducts.
2. Metal ducts with duct liner of sufficient thickness to comply with energy code and ASHRAE/IESNA 90.1.
3. Factory-insulated flexible ducts.
4. Factory-insulated plenums and casings.
5. Flexible connectors.
6. Vibration-control devices.
7. Factory-insulated access panels and doors.

3.10 INDOOR DUCT AND PLENUM INSULATION SCHEDULE

A. Concealed, supply-air duct and plenum insulation shall be one of the following:

1. Mineral-Fiber Blanket: 1-1/2 inches thick and 0.75-lb/cu. Ft. nominal density.

B. Concealed, return-air duct and plenum insulation shall be one of the following:

1. Mineral-Fiber Blanket: 1-1/2 inches thick and 0.75-lb/cu. Ft. nominal density.

C. Concealed, outdoor-air duct and plenum insulation shall be one of the following:

1. Mineral-Fiber Blanket: 1-1/2 inches thick and 0.75-lb/cu. Ft. nominal density.

D. Exposed, supply-air duct and plenum insulation shall be the following:

1. Internally lined per Section 233113 “Metal Ducts.”

E. Exposed, return-air duct and plenum insulation shall be the following:

1. Internally lined per Section 233113 “Metal Ducts.”

F. Exposed, outdoor-air duct and plenum insulation shall be the following:

1. Internally lined per Section 233113 “Metal Ducts.”

3.11 ABOVEGROUND, OUTDOOR DUCT AND PLENUM INSULATION SCHEDULE

A. Insulation materials and thicknesses are identified below. If more than one material is listed for a duct system, selection from materials listed is Contractor's option.

B. Outdoor, supply-air duct and plenum insulation shall be the following:

1. Internally lined per Section 233113 “Metal Ducts.”

C. Outdoor, return-air duct and plenum insulation shall be the following:

1. Internally lined per Section 233113 “Metal Ducts.”

D. Outdoor, outdoor-air duct and plenum insulation shall be the following:

1. Internally lined per Section 233113 “Metal Ducts.”

END OF SECTION 230713

SECTION 23 07 19 - HVAC PIPING INSULATION

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section includes insulating the following HVAC piping systems:

1. Condensate drain piping, indoors and outdoors.
2. Refrigerant suction and hot-gas piping, indoors and outdoors.

B. Related Sections:

1. Section 230713 "Duct Insulation."

1.3 ACTION SUBMITTALS

A. Product Data: For each type of product indicated. Include thermal conductivity, water-vapor permeance thickness, and jackets (both factory and field applied if any).

B. Shop Drawings: Include plans, elevations, sections, details, and attachments to other work.

1. Detail application of protective shields, saddles, and inserts at hangers for each type of insulation and hanger.
2. Detail attachment and covering of heat tracing inside insulation.
3. Detail insulation application at pipe expansion joints for each type of insulation.
4. Detail insulation application at elbows, fittings, flanges, valves, and specialties for each type of insulation.
5. Detail removable insulation at piping specialties.
6. Detail application of field-applied jackets.
7. Detail application at linkages of control devices.

1.4 INFORMATIONAL SUBMITTALS

A. Qualification Data: For qualified Installer.

B. Material Test Reports: From a qualified testing agency acceptable to authorities having jurisdiction indicating, interpreting, and certifying test results for compliance of insulation materials, sealers, attachments, cements, and jackets, with requirements indicated. Include dates of tests and test methods employed.

C. Field quality-control reports.

1.5 QUALITY ASSURANCE

A. Installer Qualifications: Skilled mechanics who have successfully completed an apprenticeship program or another craft training program certified by the Department of Labor, Bureau of Apprenticeship and Training.

B. Surface-Burning Characteristics: For insulation and related materials, as determined by testing identical products according to ASTM E 84, by a testing and inspecting agency acceptable to authorities having jurisdiction. Factory label insulation and jacket materials and adhesive, mastic, tapes, and cement material containers, with appropriate markings of applicable testing agency.

1. Insulation Installed Indoors: Flame-spread index of 25 or less, and smoke-developed index of 50 or less.
2. Insulation Installed Outdoors: Flame-spread index of 75 or less, and smoke-developed index of 150 or less.

1.6 DELIVERY, STORAGE, AND HANDLING

A. Packaging: Insulation material containers shall be marked by manufacturer with appropriate ASTM standard designation, type and grade, and maximum use temperature.

1.7 COORDINATION

A. Coordinate sizes and locations of supports, hangers, and insulation shields specified in Section 230529 "Hangers and Supports for HVAC Piping and Equipment."

B. Coordinate clearance requirements with piping Installer for piping insulation application. Before preparing piping Shop Drawings, establish and maintain clearance requirements for installation of insulation and field-applied jackets and finishes and for space required for maintenance.

C. Coordinate installation and testing of heat tracing.

1.8 SCHEDULING

A. Schedule insulation application after pressure testing systems and, where required, after installing and testing heat tracing. Insulation application may begin on segments that have satisfactory test results.

B. Complete installation and concealment of plastic materials as rapidly as possible in each area of construction.

PART 2 - PRODUCTS

2.1 INSULATION MATERIALS

A. Comply with requirements in "Piping Insulation Schedule, General," "Indoor Piping Insulation Schedule," "Outdoor, Aboveground Piping Insulation Schedule," and "Outdoor, Underground Piping Insulation Schedule" articles for where insulating materials shall be applied.

B. Products shall not contain asbestos, lead, mercury, or mercury compounds.

C. Products that come in contact with stainless steel shall have a leachable chloride content of less than 50 ppm when tested according to ASTM C 871.

D. Insulation materials for use on austenitic stainless steel shall be qualified as acceptable according to ASTM C 795.

E. Foam insulation materials shall not use CFC or HCFC blowing agents in the manufacturing process.

F. Flexible Elastomeric Insulation: Closed-cell, sponge- or expanded-rubber materials. Comply with ASTM C 534, Type I for tubular materials.

1. Products: Subject to compliance with requirements, provide one of the following:

a. Aeroflex USA, Inc.; Aerocel.
b. Armacell LLC; AP Armaflex.
c. K-Flex USA; Insul-Lock, Insul-Tube, and K-FLEX LS.

2.2 INSULATING CEMENTS

A. Mineral-Fiber Insulating Cement: Comply with ASTM C 195.

1. Products: Subject to compliance with requirements, provide one of the following:

a. Ramco Insulation, Inc.; Super-Stik.

2.3 ADHESIVES

A. Materials shall be compatible with insulation materials, jackets, and substrates and for bonding insulation to itself and to surfaces to be insulated unless otherwise indicated.

B. Flexible Elastomeric and Polyolefin Adhesive: Comply with MIL-A-24179A, Type II, Class I.

1. Products: Subject to compliance with requirements, provide one of the following:

a. Aeroflex USA, Inc.; Aeroseal.
b. Armacell LLC; Armaflex 520 Adhesive.
c. Foster Brand, Specialty Construction Brands, Inc., a business of H. B. Fuller Company; 85-75.
d. K-Flex USA; R-373 Contact Adhesive.

2. For indoor applications, adhesive shall have a VOC content of 50 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).
3. Adhesive shall comply with the testing and product requirements of the California Department of Health Services' "Standard Practice for the Testing of Volatile Organic Emissions from Various Sources Using Small-Scale Environmental Chambers."

C. Mineral-Fiber Adhesive: Comply with MIL-A-3316C, Class 2, Grade A.

1. Products: Subject to compliance with requirements, provide one of the following:

a. Childers Brand, Specialty Construction Brands, Inc., a business of H. B. Fuller Company; CP-127.
b. Eagle Bridges - Marathon Industries; 225.
c. Foster Brand, Specialty Construction Brands, Inc., a business of H. B. Fuller Company; 85-60/85-70.
d. Mon-Eco Industries, Inc.; 22-25.

2. For indoor applications, adhesive shall have a VOC content of 80 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).
3. Adhesive shall comply with the testing and product requirements of the California Department of Health Services' "Standard Practice for the Testing of Volatile Organic Emissions from Various Sources Using Small-Scale Environmental Chambers."

D. ASJ Adhesive, and FSK and PVDC Jacket Adhesive: Comply with MIL-A-3316C, Class 2, Grade A for bonding insulation jacket lap seams and joints.

1. Products: Subject to compliance with requirements, provide one of the following:

a. Childers Brand, Specialty Construction Brands, Inc., a business of H. B. Fuller Company; CP-82.
b. Eagle Bridges - Marathon Industries; 225.
c. Foster Brand, Specialty Construction Brands, Inc., a business of H. B. Fuller Company; 85-50.
d. Mon-Eco Industries, Inc.; 22-25.

2. For indoor applications, adhesive shall have a VOC content of 50 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).
3. Adhesive shall comply with the testing and product requirements of the California Department of Health Services' "Standard Practice for the Testing of Volatile Organic Emissions from Various Sources Using Small-Scale Environmental Chambers."

2.4 MASTICS

A. Materials shall be compatible with insulation materials, jackets, and substrates; comply with MIL-PRF-19565C, Type II.

1. For indoor applications, use mastics that have a VOC content of 50 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).

B. Vapor-Barrier Mastic: Water based; suitable for indoor use on below-ambient services.

1. Products: Subject to compliance with requirements, provide one of the following:

a. Foster Brand, Specialty Construction Brands, Inc., a business of H. B. Fuller Company; 30-80/30-90.
b. Vimasco Corporation; 749.

2. Water-Vapor Permeance: ASTM E 96/E 96M, Procedure B, 0.013 perm at 43-mil dry film thickness.
3. Service Temperature Range: Minus 20 to plus 180 deg F.
4. Solids Content: ASTM D 1644, 58 percent by volume and 70 percent by weight.
5. Color: White.

C. Breather Mastic: Water based; suitable for indoor and outdoor use on above-ambient services.

1. Products: Subject to compliance with requirements, provide one of the following:

    a. Childers Brand, Specialty Construction Brands, Inc., a business of H. B. Fuller Company; CP-10.
    b. Eagle Bridges - Marathon Industries; 550.
    c. Foster Brand, Specialty Construction Brands, Inc., a business of H. B. Fuller Company; 46-50.
    d. Mon-Eco Industries, Inc.; 55-50.
    e. Vimasco Corporation; WC-1/WC-5.

2. Water-Vapor Permeance: ASTM F 1249, 1.8 perms at 0.0625-inch dry film thickness.
3. Service Temperature Range: Minus 20 to plus 180 deg F.
4. Solids Content: 60 percent by volume and 66 percent by weight.
5. Color: White.

2.5 LAGGING ADHESIVES

A. Description: Comply with MIL-A-3316C, Class I, Grade A and shall be compatible with insulation materials, jackets, and substrates.

1. For indoor applications, use lagging adhesives that have a VOC content of 50 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).
2. Products: Subject to compliance with requirements, provide one of the following:

    a. Childers Brand, Specialty Construction Brands, Inc., a business of H. B. Fuller Company; CP-50 AHV2.
    b. Foster Brand, Specialty Construction Brands, Inc., a business of H. B. Fuller Company; 30-36.
    c. Vimasco Corporation; 713 and 714.

3. Fire-resistant, water-based lagging adhesive and coating for use indoors to adhere fire-resistant lagging cloths over pipe insulation.
4. Service Temperature Range: 0 to plus 180 deg F.
5. Color: White.

2.6 SEALANTS

A. FSK and Metal Jacket Flashing Sealants:

1. Products: Subject to compliance with requirements, provide one of the following:

    a. Childers Brand, Specialty Construction Brands, Inc., a business of H. B. Fuller Company; CP-76.
    b. Eagle Bridges - Marathon Industries; 405.
    c. Foster Brand, Specialty Construction Brands, Inc., a business of H. B. Fuller Company; 95-44.
    d. Mon-Eco Industries, Inc.; 44-05.

2. Materials shall be compatible with insulation materials, jackets, and substrates.
3. Fire- and water-resistant, flexible, elastomeric sealant.
4. Service Temperature Range: Minus 40 to plus 250 deg F.
5. Color: Aluminum.

6. For indoor applications, sealants shall have a VOC content of 420 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).
7. Sealants shall comply with the testing and product requirements of the California Department of Health Services' "Standard Practice for the Testing of Volatile Organic Emissions from Various Sources Using Small-Scale Environmental Chambers."

B. ASJ Flashing Sealants, and Vinyl, PVDC, and PVC Jacket Flashing Sealants:

1. Products: Subject to compliance with requirements, provide one of the following:

   a. Childers Brand, Specialty Construction Brands, Inc., a business of H. B. Fuller Company; CP-76.

2. Materials shall be compatible with insulation materials, jackets, and substrates.
3. Fire- and water-resistant, flexible, elastomeric sealant.
4. Service Temperature Range: Minus 40 to plus 250 deg F.
5. Color: White.
6. For indoor applications, sealants shall have a VOC content of 420 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).
7. Sealants shall comply with the testing and product requirements of the California Department of Health Services' "Standard Practice for the Testing of Volatile Organic Emissions from Various Sources Using Small-Scale Environmental Chambers."

2.7 FACTORY-APPLIED JACKETS

A. Insulation system schedules indicate factory-applied jackets on various applications. When factory-applied jackets are indicated, comply with the following:

1. ASJ: White, kraft-paper, fiberglass-reinforced scrim with aluminum-foil backing; complying with ASTM C 1136, Type I.
2. FSK Jacket: Aluminum-foil, fiberglass-reinforced scrim with kraft-paper backing; complying with ASTM C 1136, Type II.

2.8 FIELD-APPLIED JACKETS

A. Field-applied jackets shall comply with ASTM C 921, Type I, unless otherwise indicated.

B. FSK Jacket: Aluminum-foil-face, fiberglass-reinforced scrim with kraft-paper backing.

C. Metal Jacket:

1. Products: Subject to compliance with requirements, provide one of the following:

   a. Childers Brand, Specialty Construction Brands, Inc., a business of H. B. Fuller Company; Metal Jacketing Systems.
   b. ITW Insulation Systems; Aluminum and Stainless Steel Jacketing.
   c. RPR Products, Inc.; Insul-Mate.

2. Aluminum Jacket: Comply with ASTM B 209, Alloy 3003, 3005, 3105, or 5005, Temper H-14.

   a. Factory cut and rolled to size.
   b. Finish and thickness are indicated in field-applied jacket schedules.

c. Moisture Barrier for Outdoor Applications: 3-mil- thick, heat-bonded polyethylene and kraft paper.
d. Factory-Fabricated Fitting Covers:

1) Same material, finish, and thickness as jacket.
2) Preformed 2-piece or gore, 45- and 90-degree, short- and long-radius elbows.
3) Tee covers.
4) Flange and union covers.
5) End caps.
6) Beveled collars.
7) Valve covers.
8) Field fabricate fitting covers only if factory-fabricated fitting covers are not available.

2.9 TAPES

A. ASJ Tape: White vapor-retarder tape matching factory-applied jacket with acrylic adhesive, complying with ASTM C 1136.

1. Products: Subject to compliance with requirements, provide one of the following:

a. ABI, Ideal Tape Division; 428 AWF ASJ.
b. Avery Dennison Corporation, Specialty Tapes Division; Fasson 0836.
c. Compac Corporation; 104 and 105.
d. Venture Tape; 1540 CW Plus, 1542 CW Plus, and 1542 CW Plus/SQ.

2. Width: 3 inches.
3. Thickness: 11.5 mils.
4. Adhesion: 90 ounces force/inch in width.
5. Elongation: 2 percent.
6. Tensile Strength: 40 lbf/inch in width.
7. ASJ Tape Disks and Squares: Precut disks or squares of ASJ tape.

B. FSK Tape: Foil-face, vapor-retarder tape matching factory-applied jacket with acrylic adhesive; complying with ASTM C 1136.

1. Products: Subject to compliance with requirements, provide one of the following:

a. ABI, Ideal Tape Division; 491 AWF FSK.
b. Avery Dennison Corporation, Specialty Tapes Division; Fasson 0827.
c. Compac Corporation; 110 and 111.
d. Venture Tape; 1525 CW NT, 1528 CW, and 1528 CW/SQ.

2. Width: 3 inches.
3. Thickness: 6.5 mils.
4. Adhesion: 90 ounces force/inch in width.
5. Elongation: 2 percent.
6. Tensile Strength: 40 lbf/inch in width.
7. FSK Tape Disks and Squares: Precut disks or squares of FSK tape.

2.10 SECUREMENTS

A. Bands:

1. Products: Subject to compliance with requirements, provide one of the following:

   a. ITW Insulation Systems; Gerrard Strapping and Seals.
   b. RPR Products, Inc.; Insul-Mate Strapping, Seals, and Springs.

2. Aluminum: ASTM B 209, Alloy 3003, 3005, 3105, or 5005; Temper H-14, 0.020 inch thick, 1/2 inch wide with wing seal or closed seal.

B. Staples: Outward-clinching insulation staples, nominal 3/4-inch- wide, stainless steel or Monel.

C. Wire: 0.062-inch soft-annealed, galvanized steel.

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

   a. C & F Wire.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates and conditions for compliance with requirements for installation tolerances and other conditions affecting performance of insulation application.

1. Verify that systems to be insulated have been tested and are free of defects.
2. Verify that surfaces to be insulated are clean and dry.
3. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

A. Surface Preparation: Clean and dry surfaces to receive insulation. Remove materials that will adversely affect insulation application.

B. Surface Preparation: Clean and prepare surfaces to be insulated. Before insulating, apply a corrosion coating to insulated surfaces as follows:

1. Stainless Steel: Coat 300 series stainless steel with an epoxy primer 5 mils thick and an epoxy finish 5 mils thick if operating in a temperature range between 140 and 300 deg F. Consult coating manufacturer for appropriate coating materials and application methods for operating temperature range.
2. Carbon Steel: Coat carbon steel operating at a service temperature between 32 and 300 deg F with an epoxy coating. Consult coating manufacturer for appropriate coating materials and application methods for operating temperature range.

C. Coordinate insulation installation with the trade installing heat tracing. Comply with requirements for heat tracing that apply to insulation.

D. Mix insulating cements with clean potable water; if insulating cements are to be in contact with stainless-steel surfaces, use demineralized water.

3.3 GENERAL INSTALLATION REQUIREMENTS

A. Install insulation materials, accessories, and finishes with smooth, straight, and even surfaces; free of voids throughout the length of piping including fittings, valves, and specialties.

B. Install insulation materials, forms, vapor barriers or retarders, jackets, and thicknesses required for each item of pipe system as specified in insulation system schedules.

C. Install accessories compatible with insulation materials and suitable for the service. Install accessories that do not corrode, soften, or otherwise attack insulation or jacket in either wet or dry state.

D. Install insulation with longitudinal seams at top and bottom of horizontal runs.

E. Install multiple layers of insulation with longitudinal and end seams staggered.

F. Do not weld brackets, clips, or other attachment devices to piping, fittings, and specialties.

G. Keep insulation materials dry during application and finishing.

H. Install insulation with tight longitudinal seams and end joints. Bond seams and joints with adhesive recommended by insulation material manufacturer.

I. Install insulation with least number of joints practical.

J. Where vapor barrier is indicated, seal joints, seams, and penetrations in insulation at hangers, supports, anchors, and other projections with vapor-barrier mastic.

1. Install insulation continuously through hangers and around anchor attachments.
2. For insulation application where vapor barriers are indicated, extend insulation on anchor legs from point of attachment to supported item to point of attachment to structure. Taper and seal ends at attachment to structure with vapor-barrier mastic.
3. Install insert materials and install insulation to tightly join the insert. Seal insulation to insulation inserts with adhesive or sealing compound recommended by insulation material manufacturer.
4. Cover inserts with jacket material matching adjacent pipe insulation. Install shields over jacket, arranged to protect jacket from tear or puncture by hanger, support, and shield.

K. Apply adhesives, mastics, and sealants at manufacturer's recommended coverage rate and wet and dry film thicknesses.

L. Install insulation with factory-applied jackets as follows:

1. Draw jacket tight and smooth.
2. Cover circumferential joints with 3-inch- wide strips, of same material as insulation jacket. Secure strips with adhesive and outward clinching staples along both edges of strip, spaced 4 inches o.c.
3. Overlap jacket longitudinal seams at least 1-1/2 inches. Install insulation with longitudinal seams at bottom of pipe. Clean and dry surface to receive self-sealing lap. Staple laps with outward clinching staples along edge at [2 inches] [4 inches] o.c.

a. For below-ambient services, apply vapor-barrier mastic over staples.

4. Cover joints and seams with tape, according to insulation material manufacturer's written instructions, to maintain vapor seal.
5. Where vapor barriers are indicated, apply vapor-barrier mastic on seams and joints and at ends adjacent to pipe flanges and fittings.

M. Cut insulation in a manner to avoid compressing insulation more than 75 percent of its nominal thickness.

N. Finish installation with systems at operating conditions. Repair joint separations and cracking due to thermal movement.

O. Repair damaged insulation facings by applying same facing material over damaged areas. Extend patches at least 4 inches beyond damaged areas. Adhere, staple, and seal patches similar to butt joints.

P. For above-ambient services, do not install insulation to the following:

1. Vibration-control devices.
2. Testing agency labels and stamps.
3. Nameplates and data plates.
4. Manholes.
5. Handholes.
6. Cleanouts.

3.4 PENETRATIONS

A. Insulation Installation at Roof Penetrations: Install insulation continuously through roof penetrations.

1. Seal penetrations with flashing sealant.
2. For applications requiring only indoor insulation, terminate insulation above roof surface and seal with joint sealant. For applications requiring indoor and outdoor insulation, install insulation for outdoor applications tightly joined to indoor insulation ends. Seal joint with joint sealant.
3. Extend jacket of outdoor insulation outside roof flashing at least 2 inches below top of roof flashing.
4. Seal jacket to roof flashing with flashing sealant.

B. Insulation Installation at Underground Exterior Wall Penetrations: Terminate insulation flush with sleeve seal. Seal terminations with flashing sealant.

C. Insulation Installation at Aboveground Exterior Wall Penetrations: Install insulation continuously through wall penetrations.

1. Seal penetrations with flashing sealant.
2. For applications requiring only indoor insulation, terminate insulation inside wall surface and seal with joint sealant. For applications requiring indoor and outdoor insulation, install insulation for outdoor applications tightly joined to indoor insulation ends. Seal joint with joint sealant.
3. Extend jacket of outdoor insulation outside wall flashing and overlap wall flashing at least 2 inches.
4. Seal jacket to wall flashing with flashing sealant.

D. Insulation Installation at Interior Wall and Partition Penetrations (That Are Not Fire Rated): Install insulation continuously through walls and partitions.

E. Insulation Installation at Fire-Rated Wall and Partition Penetrations: Install insulation continuously through penetrations of fire-rated walls and partitions.

1. Comply with requirements in Section 078413 "Penetration Firestopping" for firestopping and fire-resistive joint sealers.

F. Insulation Installation at Floor Penetrations:

1. Pipe: Install insulation continuously through floor penetrations.
2. Seal penetrations through fire-rated assemblies. Comply with requirements in Section 078413 "Penetration Firestopping."

3.5 GENERAL PIPE INSULATION INSTALLATION

A. Requirements in this article generally apply to all insulation materials except where more specific requirements are specified in various pipe insulation material installation articles.

B. Insulation Installation on Fittings, Valves, Strainers, Flanges, and Unions:

1. Install insulation over fittings, valves, strainers, flanges, unions, and other specialties with continuous thermal and vapor-retarder integrity unless otherwise indicated.
2. Insulate pipe elbows using preformed fitting insulation or mitered fittings made from same material and density as adjacent pipe insulation. Each piece shall be butted tightly against adjoining piece and bonded with adhesive. Fill joints, seams, voids, and irregular surfaces with insulating cement finished to a smooth, hard, and uniform contour that is uniform with adjoining pipe insulation.
3. Insulate tee fittings with preformed fitting insulation or sectional pipe insulation of same material and thickness as used for adjacent pipe. Cut sectional pipe insulation to fit. Butt each section closely to the next and hold in place with tie wire. Bond pieces with adhesive.
4. Insulate valves using preformed fitting insulation or sectional pipe insulation of same material, density, and thickness as used for adjacent pipe. Overlap adjoining pipe insulation by not less than two times the thickness of pipe insulation, or one pipe diameter, whichever is thicker. For valves, insulate up to and including the bonnets, valve stuffing-box studs, bolts, and nuts. Fill joints, seams, and irregular surfaces with insulating cement.
5. Insulate strainers using preformed fitting insulation or sectional pipe insulation of same material, density, and thickness as used for adjacent pipe. Overlap adjoining pipe insulation by not less than two times the thickness of pipe insulation, or one pipe diameter, whichever is thicker. Fill joints, seams, and irregular surfaces with insulating cement. Insulate strainers so strainer basket flange or plug can be easily removed and replaced without damaging the insulation and jacket. Provide a removable reusable insulation cover. For below-ambient services, provide a design that maintains vapor barrier.
6. Insulate flanges and unions using a section of oversized preformed pipe insulation. Overlap adjoining pipe insulation by not less than two times the thickness of pipe insulation, or one pipe diameter, whichever is thicker.
7. Cover segmented insulated surfaces with a layer of finishing cement and coat with a mastic. Install vapor-barrier mastic for below-ambient services and a breather mastic for above-ambient services. Reinforce the mastic with fabric-reinforcing mesh. Trowel the mastic to a smooth and well-shaped contour.

8. For services not specified to receive a field-applied jacket except for flexible elastomeric and polyolefin, install fitted PVC cover over elbows, tees, strainers, valves, flanges, and unions. Terminate ends with PVC end caps. Tape PVC covers to adjoining insulation facing using PVC tape.
9. Stencil or label the outside insulation jacket of each union with the word "union." Match size and color of pipe labels.

C. Insulate instrument connections for thermometers, pressure gages, pressure temperature taps, test connections, flow meters, sensors, switches, and transmitters on insulated pipes. Shape insulation at these connections by tapering it to and around the connection with insulating cement and finish with finishing cement, mastic, and flashing sealant.

D. Install removable insulation covers at locations indicated. Installation shall conform to the following:

1. Make removable flange and union insulation from sectional pipe insulation of same thickness as that on adjoining pipe. Install same insulation jacket as adjoining pipe insulation.
2. When flange and union covers are made from sectional pipe insulation, extend insulation from flanges or union long at least two times the insulation thickness over adjacent pipe insulation on each side of flange or union. Secure flange cover in place with stainless-steel or aluminum bands. Select band material compatible with insulation and jacket.
3. Construct removable valve insulation covers in same manner as for flanges, except divide the two-part section on the vertical center line of valve body.
4. When covers are made from block insulation, make two halves, each consisting of mitered blocks wired to stainless-steel fabric. Secure this wire frame, with its attached insulation, to flanges with tie wire. Extend insulation at least 2 inches over adjacent pipe insulation on each side of valve. Fill space between flange or union cover and pipe insulation with insulating cement. Finish cover assembly with insulating cement applied in two coats. After first coat is dry, apply and trowel second coat to a smooth finish.
5. Unless a PVC jacket is indicated in field-applied jacket schedules, finish exposed surfaces with a metal jacket.

3.6 INSTALLATION OF FLEXIBLE ELASTOMERIC INSULATION

A. Seal longitudinal seams and end joints with manufacturer's recommended adhesive to eliminate openings in insulation that allow passage of air to surface being insulated.

B. Insulation Installation on Pipe Flanges:

1. Install pipe insulation to outer diameter of pipe flange.
2. Make width of insulation section same as overall width of flange and bolts, plus twice the thickness of pipe insulation.
3. Fill voids between inner circumference of flange insulation and outer circumference of adjacent straight pipe segments with cut sections of sheet insulation of same thickness as pipe insulation.
4. Secure insulation to flanges and seal seams with manufacturer's recommended adhesive to eliminate openings in insulation that allow passage of air to surface being insulated.

C. Insulation Installation on Pipe Fittings and Elbows:

1. Install mitered sections of pipe insulation.
2. Secure insulation materials and seal seams with manufacturer's recommended adhesive to eliminate openings in insulation that allow passage of air to surface being insulated.

D. Insulation Installation on Valves and Pipe Specialties:

1. Install preformed valve covers manufactured of same material as pipe insulation when available.
2. When preformed valve covers are not available, install cut sections of pipe and sheet insulation to valve body. Arrange insulation to permit access to packing and to allow valve operation without disturbing insulation.
3. Install insulation to flanges as specified for flange insulation application.
4. Secure insulation to valves and specialties and seal seams with manufacturer's recommended adhesive to eliminate openings in insulation that allow passage of air to surface being insulated.

3.7 INSTALLATION OF MINERAL-FIBER INSULATION

A. Insulation Installation on Straight Pipes and Tubes:

1. Secure each layer of preformed pipe insulation to pipe with wire or bands and tighten bands without deforming insulation materials.
2. Where vapor barriers are indicated, seal longitudinal seams, end joints, and protrusions with vapor-barrier mastic and joint sealant.
3. For insulation with factory-applied jackets on above-ambient surfaces, secure laps with outward-clinched staples at 6 inches o.c.
4. For insulation with factory-applied jackets on below-ambient surfaces, do not staple longitudinal tabs. Instead, secure tabs with additional adhesive as recommended by insulation material manufacturer and seal with vapor-barrier mastic and flashing sealant.

B. Insulation Installation on Pipe Flanges:

1. Install preformed pipe insulation to outer diameter of pipe flange.
2. Make width of insulation section same as overall width of flange and bolts, plus twice the thickness of pipe insulation.
3. Fill voids between inner circumference of flange insulation and outer circumference of adjacent straight pipe segments with mineral-fiber blanket insulation.
4. Install jacket material with manufacturer's recommended adhesive, overlap seams at least 1 inch, and seal joints with flashing sealant.

C. Insulation Installation on Pipe Fittings and Elbows:

1. Install preformed sections of same material as straight segments of pipe insulation when available.
2. When preformed insulation elbows and fittings are not available, install mitered sections of pipe insulation, to a thickness equal to adjoining pipe insulation. Secure insulation materials with wire or bands.

D. Insulation Installation on Valves and Pipe Specialties:

1. Install preformed sections of same material as straight segments of pipe insulation when available.
2. When preformed sections are not available, install mitered sections of pipe insulation to valve body.
3. Arrange insulation to permit access to packing and to allow valve operation without disturbing insulation.
4. Install insulation to flanges as specified for flange insulation application.

3.8 FIELD-APPLIED JACKET INSTALLATION

A. Where FSK jackets are indicated, install as follows:

1. Draw jacket material smooth and tight.
2. Install lap or joint strips with same material as jacket.
3. Secure jacket to insulation with manufacturer's recommended adhesive.
4. Install jacket with 1-1/2-inch laps at longitudinal seams and 3-inch- wide joint strips at end joints.
5. Seal openings, punctures, and breaks in vapor-retarder jackets and exposed insulation with vapor-barrier mastic.

B. Where metal jackets are indicated, install with 2-inch overlap at longitudinal seams and end joints. Overlap longitudinal seams arranged to shed water. Seal end joints with weatherproof sealant recommended by insulation manufacturer. Secure jacket with stainless-steel bands 12 inches o.c. and at end joints.

3.9 FINISHES

A. Pipe Insulation with ASJ, Glass-Cloth, or Other Paintable Jacket Material: Paint jacket with paint system identified below and as specified in Section 099113 "Exterior Painting" and Section 099123 "Interior Painting."

1. Flat Acrylic Finish: Two finish coats over a primer that is compatible with jacket material and finish coat paint. Add fungicidal agent to render fabric mildew proof.

a. Finish Coat Material: Interior, flat, latex-emulsion size.

B. Flexible Elastomeric Thermal Insulation: After adhesive has fully cured, apply two coats of insulation manufacturer's recommended protective coating.

C. Color: Final color as selected by Architect. Vary first and second coats to allow visual inspection of the completed Work.

D. Do not field paint aluminum or stainless-steel jackets.

3.10 FIELD QUALITY CONTROL

A. Testing Agency: Engage a qualified testing agency to perform tests and inspections.

B. Perform tests and inspections.

C. Tests and Inspections:

1. Inspect pipe, fittings, strainers, and valves, randomly selected by Architect, by removing field-applied jacket and insulation in layers in reverse order of their installation. Extent of inspection shall be limited to three locations of straight pipe, three locations of threaded fittings, three locations of welded fittings, two locations of threaded strainers, two locations of welded strainers, three locations of threaded valves, and three locations of flanged valves for each pipe service defined in the "Piping Insulation Schedule, General" Article.

D. All insulation applications will be considered defective Work if sample inspection reveals noncompliance with requirements.

3.11 PIPING INSULATION SCHEDULE, GENERAL

A. Acceptable preformed pipe and tubular insulation materials and thicknesses are identified for each piping system and pipe size range. If more than one material is listed for a piping system, selection from materials listed is Contractor's option.

B. Items Not Insulated: Unless otherwise indicated, do not install insulation on the following:

1. Drainage piping located in crawl spaces.
2. Underground piping.
3. Chrome-plated pipes and fittings unless there is a potential for personnel injury.

3.12 INDOOR PIPING INSULATION SCHEDULE

A. Condensate and Equipment Drain Water:

1. All Pipe Sizes: Insulation shall be the following:

a. Flexible Elastomeric: 1 inch thick.

B. Refrigerant Suction and Hot-Gas Piping:

1. All Pipe Sizes: Insulation shall be the following:

a. Flexible Elastomeric: 1 inch thick.

3.13 OUTDOOR, ABOVEGROUND PIPING INSULATION SCHEDULE

A. Refrigerant Suction and Hot-Gas Piping:

1. All Pipe Sizes: Insulation shall be the following:

a. Flexible Elastomeric: 2 inches thick.

3.14 OUTDOOR, UNDERGROUND PIPING INSULATION SCHEDULE

A. Loose-fill insulation, for belowground piping, is specified in Section 232113.13 "Underground Hydronic Piping”.

3.15 INDOOR, FIELD-APPLIED JACKET SCHEDULE

A. Install jacket over insulation material. For insulation with factory-applied jacket, install the field-applied jacket over the factory-applied jacket.

B. If more than one material is listed, selection from materials listed is Contractor's option.

C. Piping, Concealed:

1. None.

D. Piping, Exposed:

1. None.

3.16 OUTDOOR, FIELD-APPLIED JACKET SCHEDULE

A. Install jacket over insulation material. For insulation with factory-applied jacket, install the field-applied jacket over the factory-applied jacket.

B. If more than one material is listed, selection from materials listed is Contractor's option.

C. Piping, Concealed:

1. None.

D. Piping, Exposed:

1. Painted Aluminum, Corrugated: 0.024 inch thick.

3.17 UNDERGROUND, FIELD-INSTALLED INSULATION JACKET

A. For underground direct-buried piping applications, install underground direct-buried jacket over insulation material.

END OF SECTION 230719

SECTION 23 23 00 - REFRIGERANT PIPING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. This Section includes refrigerant piping used for air-conditioning applications.

1.3 ACTION SUBMITTALS

A. Shop Drawings: Show layout of refrigerant piping and specialties, including pipe, tube, and fitting sizes, flow capacities, valve arrangements and locations, slopes of horizontal runs, oil traps, double risers, wall and floor penetrations, and equipment connection details. Show interface and spatial relationships between piping and equipment.

1. Refrigerant piping indicated on Drawings is schematic only. Size piping and design actual piping layout, including oil traps, double risers, specialties, and pipe and tube sizes to accommodate, as a minimum, equipment provided, elevation difference between compressor and evaporator, and length of piping to ensure proper operation and compliance with warranties of connected equipment.

1.4 INFORMATIONAL SUBMITTALS

A. Field quality-control test reports.

1.5 QUALITY ASSURANCE

A. Welding: Qualify procedures and personnel according to ASME Boiler and Pressure Vessel Code: Section IX, "Welding and Brazing Qualifications."

B. Comply with ASHRAE 15, "Safety Code for Refrigeration Systems."

C. Comply with ASME B31.5, "Refrigeration Piping and Heat Transfer Components."

1.6 PRODUCT STORAGE AND HANDLING

A. Store piping in a clean and protected area with end caps in place to ensure that piping interior and exterior are clean when installed.

PART 2 - PRODUCTS

2.1 COPPER TUBE AND FITTINGS

A. Copper Tube: ASTM B 88, Type L.

B. Wrought-Copper Fittings: ASME B16.22.

C. Wrought-Copper Unions: ASME B16.22.

D. Brazing Filler Metals: AWS A5.8.

PART 3 - EXECUTION

3.1 PIPING APPLICATIONS FOR REFRIGERANT R-454b and R-32

A. Suction Lines for Conventional Air-Conditioning Applications: Copper, Type L, drawn-temper tubing and wrought-copper fittings with brazed joints.

B. Hot-Gas and Liquid Lines: Copper, Type L, annealed- or drawn-temper tubing and wrought-copper fittings with brazed joints.

3.2 PIPING INSTALLATION

A. Drawing plans, schematics, and diagrams indicate general location and arrangement of piping systems; indicated locations and arrangements were used to size pipe and calculate friction loss, expansion, pump sizing, and other design considerations. Install piping as indicated unless deviations to layout are approved on Shop Drawings.

B. Install refrigerant piping according to ASHRAE 15.

C. Install piping in concealed locations unless otherwise indicated and except in equipment rooms and service areas.

D. Install piping indicated to be exposed and piping in equipment rooms and service areas at right angles or parallel to building walls. Diagonal runs are prohibited unless specifically indicated otherwise.

E. Install piping above accessible ceilings to allow sufficient space for ceiling panel removal.

F. Install piping adjacent to machines to allow service and maintenance.

G. Install piping free of sags and bends.

H. Install fittings for changes in direction and branch connections.

I. Install piping as short and direct as possible, with a minimum number of joints, elbows, and fittings.

J. Arrange piping to allow inspection and service of refrigeration equipment. Install valves and specialties in accessible locations to allow for service and inspection. Install access doors or

panels as specified in Section 083113 "Access Doors and Frames" if valves or equipment requiring maintenance is concealed behind finished surfaces.

K. Install refrigerant piping in rigid or flexible conduit in locations where exposed to mechanical injury.

L. Slope refrigerant piping as follows:

1. Install horizontal hot-gas discharge piping with a uniform slope downward away from compressor.
2. Install horizontal suction lines with a uniform slope downward to compressor.
3. Liquid lines may be installed level.

M. When brazing, remove solenoid-valve coils and sight glasses; also remove valve stems, seats, and packing, and accessible internal parts of refrigerant specialties. Do not apply heat near expansion-valve bulb.

N. Install piping with adequate clearance between pipe and adjacent walls and hangers or between pipes for insulation installation.

O. Identify refrigerant piping and valves according to Section 230553 "Identification for HVAC Piping and Equipment."

P. Install sleeves for piping penetrations of walls, ceilings, and floors.

Q. Install sleeve seals for piping penetrations of concrete walls and slabs.

R. Install escutcheons for piping penetrations of walls, ceilings, and floors.

3.3 PIPE JOINT CONSTRUCTION

A. Ream ends of pipes and tubes and remove burrs. Bevel plain ends of steel pipe.

B. Remove scale, slag, dirt, and debris from inside and outside of pipe and fittings before assembly.

C. Fill pipe and fittings with an inert gas (nitrogen or carbon dioxide), during brazing or welding, to prevent scale formation.

D. Brazed Joints: Construct joints according to AWS's "Brazing Handbook," Chapter "Pipe and Tube."

1. Use Type BcuP, copper-phosphorus alloy for joining copper socket fittings with copper pipe.
2. Use Type BAg, cadmium-free silver alloy for joining copper with bronze or steel.

3.4 HANGERS AND SUPPORTS

A. Hanger, support, and anchor products are specified in Section 230529 "Hangers and Supports for HVAC Piping and Equipment."

B. Install the following pipe attachments:

1. Adjustable steel clevis hangers for individual horizontal runs less than 20 feet long.
2. Roller hangers and spring hangers for individual horizontal runs 20 feet or longer.
3. Pipe Roller: MSS SP-58, Type 44 for multiple horizontal piping 20 feet or longer, supported on a trapeze.
4. Spring hangers to support vertical runs.
5. Copper-clad hangers and supports for hangers and supports in direct contact with copper pipe.

C. Install hangers for copper tubing with the following maximum spacing and minimum rod sizes:

1. NPS 1/2: Maximum span, 60 inches; minimum rod size, 1/4 inch.
2. NPS 5/8: Maximum span, 60 inches; minimum rod size, 1/4 inch.
3. NPS 1: Maximum span, 72 inches; minimum rod size, 1/4 inch.
4. NPS 1-1/4: Maximum span, 96 inches; minimum rod size, 3/8 inch.
5. NPS 1-1/2: Maximum span, 96 inches; minimum rod size, 3/8 inch.
6. NPS 2: Maximum span, 96 inches; minimum rod size, 3/8 inch.
7. NPS 2-1/2: Maximum span, 108 inches; minimum rod size, 3/8 inch.
8. NPS 3: Maximum span, 10 feet; minimum rod size, 3/8 inch.
9. NPS 4: Maximum span, 12 feet; minimum rod size, 1/2 inch.

D. Support multifloor vertical runs at least at each floor.

3.5 FIELD QUALITY CONTROL

A. Perform tests and inspections and prepare test reports.

B. Tests and Inspections:

1. Comply with ASME B31.5, Chapter VI.
2. Test refrigerant piping, specialties, and receivers. Isolate compressor, condenser, evaporator, and safety devices from test pressure if they are not rated above the test pressure.
3. Test high- and low-pressure side piping of each system separately at not less than the pressures indicated in Part 1 "Performance Requirements" Article.

    a. Fill system with nitrogen to the required test pressure.
    b. System shall maintain test pressure at the manifold gage throughout duration of test.
    c. Test joints and fittings with electronic leak detector or by brushing a small amount of soap and glycerin solution over joints.
    d. Remake leaking joints using new materials, and retest until satisfactory results are achieved.

3.6 SYSTEM CHARGING

A. Charge system using the following procedures:

1. Install core in filter dryers after leak test but before evacuation.
2. Evacuate entire refrigerant system with a vacuum pump to 500 micrometers. If vacuum holds for 12 hours, system is ready for charging.
3. Break vacuum with refrigerant gas, allowing pressure to build up to 2 psig.
4. Charge system with a new filter-dryer core in charging line.

3.7 ADJUSTING

A. Adjust thermostatic expansion valve to obtain proper evaporator superheat.

B. Adjust high- and low-pressure switch settings to avoid short cycling in response to fluctuating suction pressure.

C. Adjust set-point temperature of air-conditioning to the system design temperature.

D. Perform the following adjustments before operating the refrigeration system, according to manufacturer's written instructions:

1. Verify that compressor oil level is correct.
2. Open compressor suction and discharge valves.
3. Open refrigerant valves except bypass valves that are used for other purposes.
4. Check open compressor-motor alignment and verify lubrication for motors and bearings.

E. Replace core of replaceable filter dryer after system has been adjusted and after design flow rates and pressures are established.

END OF SECTION 232300

SECTION 23 31 13 - METAL DUCTS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section Includes:

1. Single-wall rectangular ducts and fittings.
2. Single-wall round ducts and fittings.
3. Sheet metal materials.
4. Duct liner.
5. Sealants and gaskets.
6. Hangers and supports.
7. Seismic-restraint devices.

B. Related Sections:

1. Section 230593 "Testing, Adjusting, and Balancing for HVAC" for testing, adjusting, and balancing requirements for metal ducts.
2. Section 233300 "Air Duct Accessories" for dampers, sound-control devices, duct-mounting access doors and panels, turning vanes, and flexible ducts.

1.3 PERFORMANCE REQUIREMENTS

A. Structural Performance: Duct hangers and supports and seismic restraints shall withstand the effects of gravity and seismic loads and stresses within limits and under conditions described in SMACNA's "HVAC Duct Construction Standards - Metal and Flexible" and ASCE/SEI 7.

B. Airstream Surfaces: Surfaces in contact with the airstream shall comply with requirements in ASHRAE 62.1.

1.4 ACTION SUBMITTALS

A. Product Data: For each type of the following products:

1. Liners and adhesives.
2. Sealants and gaskets.
3. Seismic-restraint devices.

B. Shop Drawings:

1. Fabrication, assembly, and installation, including plans, elevations, sections, components, and attachments to other work.

2. Factory- and shop-fabricated ducts and fittings.
3. Duct layout indicating sizes, configuration, liner material, and static-pressure classes.
4. Elevation of top of ducts.
5. Dimensions of main duct runs from building grid lines.
6. Fittings.
7. Reinforcement and spacing.
8. Seam and joint construction.
9. Penetrations through fire-rated and other partitions.
10. Equipment installation based on equipment being used on Project.
11. Locations for duct accessories, including dampers, turning vanes, and access doors and panels.
12. Hangers and supports, including methods for duct and building attachment, seismic restraints, and vibration isolation.

1.5 INFORMATIONAL SUBMITTALS

A. Coordination Drawings: Plans, drawn to scale, on which the following items are shown and coordinated with each other, using input from installers of the items involved:

1. Duct installation in congested spaces, indicating coordination with general construction, building components, and other building services. Indicate proposed changes to duct layout.
2. Suspended ceiling components.
3. Structural members to which duct will be attached.
4. Size and location of initial access modules for acoustical tile.
5. Penetrations of smoke barriers and fire-rated construction.
6. Items penetrating finished ceiling including the following:

   a. Lighting fixtures.
   b. Air outlets and inlets.
   c. Speakers.
   d. Sprinklers.
   e. Access panels.
   f. Perimeter moldings.

B. Welding certificates.

C. Field quality-control reports.

1.6 QUALITY ASSURANCE

A. Welding Qualifications: Qualify procedures and personnel according to AWS D1.1/D1.1M, "Structural Welding Code - Steel," for hangers and supports. AWS D9.1M/D9.1, "Sheet Metal Welding Code," for duct joint and seam welding.

B. Welding Qualifications: Qualify procedures and personnel according to the following:

1. AWS D1.1/D1.1M, "Structural Welding Code - Steel," for hangers and supports.
2. AWS D9.1M/D9.1, "Sheet Metal Welding Code," for duct joint and seam welding.

C. ASHRAE Compliance: Applicable requirements in ASHRAE 62.1, Section 5 - "Systems and Equipment" and Section 7 - "Construction and System Start-up."

D. ASHRAE/IESNA Compliance: Applicable requirements in ASHRAE/IESNA 90.1, Section 6.4.4 - "HVAC System Construction and Insulation."

PART 2 - PRODUCTS

2.1 SINGLE-WALL RECTANGULAR DUCTS AND FITTINGS

A. General Fabrication Requirements: Comply with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible" based on indicated static-pressure class unless otherwise indicated.

B. Transverse Joints: Select joint types and fabricate according to SMACNA's "HVAC Duct Construction Standards - Metal and Flexible," Figure 2-1, "Rectangular Duct/Transverse Joints," for static-pressure class, applicable sealing requirements, materials involved, duct-support intervals, and other provisions in SMACNA's "HVAC Duct Construction Standards - Metal and Flexible."

C. Longitudinal Seams: Select seam types and fabricate according to SMACNA's "HVAC Duct Construction Standards - Metal and Flexible," Figure 2-2, "Rectangular Duct/Longitudinal Seams," for static-pressure class, applicable sealing requirements, materials involved, duct-support intervals, and other provisions in SMACNA's "HVAC Duct Construction Standards - Metal and Flexible."

D. Elbows, Transitions, Offsets, Branch Connections, and Other Duct Construction: Select types and fabricate according to SMACNA's "HVAC Duct Construction Standards - Metal and Flexible," Chapter 4, "Fittings and Other Construction," for static-pressure class, applicable sealing requirements, materials involved, duct-support intervals, and other provisions in SMACNA's "HVAC Duct Construction Standards - Metal and Flexible."

2.2 SINGLE-WALL ROUND DUCTS AND FITTINGS

A. General Fabrication Requirements: Comply with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible," Chapter 3, "Round, Oval, and Flexible Duct," based on indicated static-pressure class unless otherwise indicated.

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

   a. Lindab Inc.
   b. McGill AirFlow LLC.
   c. SEMCO Incorporated.
   d. Sheet Metal Connectors, Inc.
   e. Spiral Manufacturing Co., Inc.

B. Transverse Joints: Select joint types and fabricate according to SMACNA's "HVAC Duct Construction Standards - Metal and Flexible," Figure 3-1, "Round Duct Transverse Joints," for static-pressure class, applicable sealing requirements, materials involved, duct-support intervals, and other provisions in SMACNA's "HVAC Duct Construction Standards - Metal and Flexible."

1. Transverse Joints in Ducts Larger Than 60 Inches in Diameter: Flanged.

C. Longitudinal Seams: Select seam types and fabricate according to SMACNA's "HVAC Duct Construction Standards - Metal and Flexible," Figure 3-2, "Round Duct Longitudinal Seams," for static-pressure class, applicable sealing requirements, materials involved, duct-support intervals, and other provisions in SMACNA's "HVAC Duct Construction Standards - Metal and Flexible."

1. Fabricate round ducts larger than 90 inches in diameter with butt-welded longitudinal seams.

D. Tees and Laterals: Select types and fabricate according to SMACNA's "HVAC Duct Construction Standards - Metal and Flexible," Figure 3-5, "90 Degree Tees and Laterals," and Figure 3-6, "Conical Tees," for static-pressure class, applicable sealing requirements, materials involved, duct-support intervals, and other provisions in SMACNA's "HVAC Duct Construction Standards - Metal and Flexible."

2.3 SHEET METAL MATERIALS

A. General Material Requirements: Comply with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible" for acceptable materials, material thicknesses, and duct construction methods unless otherwise indicated. Sheet metal materials shall be free of pitting, seam marks, roller marks, stains, discolorations, and other imperfections.

B. Galvanized Sheet Steel: Comply with ASTM A 653/A 653M.

1. Galvanized Coating Designation: G90.
2. Finishes for Surfaces Exposed to View: Mill phosphatized.

C. Reinforcement Shapes and Plates: ASTM A 36/A 36M, steel plates, shapes, and bars; black and galvanized.

1. Where black- and galvanized-steel shapes and plates are used to reinforce aluminum ducts, isolate the different metals with butyl rubber, neoprene, or EPDM gasket materials.

D. Tie Rods: Galvanized steel, 1/4-inch minimum diameter for lengths 36 inches or less; 3/8-inch minimum diameter for lengths longer than 36 inches.

2.4 DUCT LINER

A. Fibrous-Glass Duct Liner: Comply with ASTM C 1071, NFPA 90A, or NFPA 90B; and with NAIMA AH124, "Fibrous Glass Duct Liner Standard."

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

a. CertainTeed Corporation; Insulation Group.
b. Johns Manville.
c. Knauf Insulation.
d. Owens Corning.

2. Antimicrobial Erosion-Resistant Coating: Apply to the surface of the liner that will form the interior surface of the duct to act as a moisture repellent and erosion-resistant coating. Antimicrobial compound shall be tested for efficacy by an NRTL and registered by the EPA for use in HVAC systems.

3. Water-Based Liner Adhesive: Comply with NFPA 90A or NFPA 90B and with ASTM C 916.

    a. For indoor applications, adhesive shall have a VOC content of 80 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).
    b. Adhesive shall comply with the testing and product requirements of the California Department of Health Services' "Standard Practice for the Testing of Volatile Organic Emissions from Various Sources Using Small-Scale Environmental Chambers."

B. Insulation Pins and Washers:

1. Cupped-Head, Capacitor-Discharge-Weld Pins: Copper- or zinc-coated steel pin, fully annealed for capacitor-discharge welding, 0.106-inch-diameter shank, length to suit depth of insulation indicated with integral 1-1/2-inch galvanized carbon-steel washer.
2. Insulation-Retaining Washers: Self-locking washers formed from 0.016-inch- thick galvanized steel; with beveled edge sized as required to hold insulation securely in place but not less than 1-1/2 inches in diameter.

C. Shop Application of Duct Liner: Comply with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible," Figure 7-11, "Flexible Duct Liner Installation."

1. Adhere a single layer of indicated thickness of duct liner with at least 90 percent adhesive coverage at liner contact surface area. Attaining indicated thickness with multiple layers of duct liner is prohibited.
2. Apply adhesive to transverse edges of liner facing upstream that do not receive metal nosing.
3. Butt transverse joints without gaps, and coat joint with adhesive.
4. Fold and compress liner in corners of rectangular ducts or cut and fit to ensure butted-edge overlapping.
5. Do not apply liner in rectangular ducts with longitudinal joints, except at corners of ducts, unless duct size and dimensions of standard liner make longitudinal joints necessary.
6. Apply adhesive coating on longitudinal seams in ducts with air velocity of 2500 fpm.
7. Secure liner with mechanical fasteners 4 inches from corners and at intervals not exceeding 12 inches transversely; at 3 inches from transverse joints and at intervals not exceeding 18 inches longitudinally.
8. Secure transversely oriented liner edges facing the airstream with metal nosings that have either channel or "Z" profiles or are integrally formed from duct wall. Fabricate edge facings at the following locations:

    a. Fan discharges.
    b. Intervals of lined duct preceding unlined duct.
    c. Upstream edges of transverse joints in ducts where air velocities are higher than 2500 fpm or where indicated.

9. Secure insulation between perforated sheet metal inner duct of same thickness as specified for outer shell. Use mechanical fasteners that maintain inner duct at uniform distance from outer shell without compressing insulation.

    a. Sheet Metal Inner Duct Perforations: 3/32-inch diameter, with an overall open area of 23 percent.

10. Terminate inner ducts with buildouts attached to fire-damper sleeves, dampers, turning vane assemblies, or other devices. Fabricated buildouts (metal hat sections) or other

buildout means are optional; when used, secure buildouts to duct walls with bolts, screws, rivets, or welds.

2.5 SEALANT AND GASKETS

A. General Sealant and Gasket Requirements: Surface-burning characteristics for sealants and gaskets shall be a maximum flame-spread index of 25 and a maximum smoke-developed index of 50 when tested according to UL 723; certified by an NRTL.

B. Two-Part Tape Sealing System:

1. Tape: Woven cotton fiber impregnated with mineral gypsum and modified acrylic/silicone activator to react exothermically with tape to form hard, durable, airtight seal.
2. Tape Width: 4 inches.
3. Sealant: Modified styrene acrylic.
4. Water resistant.
5. Mold and mildew resistant.
6. Maximum Static-Pressure Class: 10-inch wg, positive and negative.
7. Service: Indoor and outdoor.
8. Service Temperature: Minus 40 to plus 200 deg F.
9. Substrate: Compatible with galvanized sheet steel (both PVC coated and bare), stainless steel, or aluminum.
10. For indoor applications, sealant shall have a VOC content of 250 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).
11. Sealant shall comply with the testing and product requirements of the California Department of Health Services' "Standard Practice for the Testing of Volatile Organic Emissions from Various Sources Using Small-Scale Environmental Chambers."

C. Water-Based Joint and Seam Sealant:

1. Application Method: Brush on.
2. Solids Content: Minimum 65 percent.
3. Shore A Hardness: Minimum 20.
4. Water resistant.
5. Mold and mildew resistant.
6. VOC: Maximum 75 g/L (less water).
7. Maximum Static-Pressure Class: 10-inch wg, positive and negative.
8. Service: Indoor or outdoor.
9. Substrate: Compatible with galvanized sheet steel (both PVC coated and bare), stainless steel, or aluminum sheets.

D. Flanged Joint Sealant: Comply with ASTM C 920.

1. General: Single-component, acid-curing, silicone, elastomeric.
2. Type: S.
3. Grade: NS.
4. Class: 25.
5. Use: O.
6. For indoor applications, sealant shall have a VOC content of 250 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).
7. Sealant shall comply with the testing and product requirements of the California Department of Health Services' "Standard Practice for the Testing of Volatile Organic Emissions from Various Sources Using Small-Scale Environmental Chambers."

E. Flange Gaskets: Butyl rubber, neoprene, or EPDM polymer with polyisobutylene plasticizer.

F. Round Duct Joint O-Ring Seals:

1. Seal shall provide maximum leakage class of 3 cfm/100 sq. ft. at 1-inch wg and shall be rated for 10-inch wg static-pressure class, positive or negative.
2. EPDM O-ring to seal in concave bead in coupling or fitting spigot.
3. Double-lipped, EPDM O-ring seal, mechanically fastened to factory-fabricated couplings and fitting spigots.

2.6 HANGERS AND SUPPORTS

A. Hanger Rods for Noncorrosive Environments: Cadmium-plated steel rods and nuts.

B. Strap and Rod Sizes: Comply with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible," Table 5-1, "Rectangular Duct Hangers Minimum Size," and Table 5-2, "Minimum Hanger Sizes for Round Duct."

C. Steel Cables for Galvanized-Steel Ducts: Galvanized steel complying with ASTM A 603.

D. Steel Cable End Connections: Cadmium-plated steel assemblies with brackets, swivel, and bolts designed for duct hanger service; with an automatic-locking and clamping device.

E. Duct Attachments: Sheet metal screws, blind rivets, or self-tapping metal screws; compatible with duct materials.

F. Trapeze and Riser Supports:

1. Supports for Galvanized-Steel Ducts: Galvanized-steel shapes and plates.

2.7 SEISMIC-RESTRAINT DEVICES

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1. Cooper B-Line, Inc.; a division of Cooper Industries.
2. Ductmate Industries, Inc.
3. Hilti Corp.
4. Mason Industries.
5. TOLCO; a brand of NIBCO INC.
6. Unistrut Corporation; Tyco International, Ltd.

B. General Requirements for Restraint Components: Rated strengths, features, and applications shall be as defined in reports by the Office of Statewide Health Planning and Development for the State of California.

1. Structural Safety Factor: Allowable strength in tension, shear, and pullout force of components shall be at least four times the maximum seismic forces to which they will be subjected.

C. Channel Support System: Shop- or field-fabricated support assembly made of slotted steel channels rated in tension, compression, and torsion forces and with accessories for attachment

to braced component at one end and to building structure at the other end. Include matching components and corrosion-resistant coating.

D. Restraint Cables: ASTM A 603, galvanized-steel cables with end connections made of cadmium-plated steel assemblies with brackets, swivel, and bolts designed for restraining cable service; and with an automatic-locking and clamping device or double-cable clips.

E. Hanger Rod Stiffener: Steel tube or steel slotted-support-system sleeve with internally bolted connections or Reinforcing steel angle clamped to hanger rod.

F. Mechanical Anchor Bolts: Drilled-in and stud-wedge or female-wedge type. Select anchor bolts with strength required for anchor and as tested according to ASTM E 488.

PART 3 - EXECUTION

3.1 DUCT INSTALLATION

A. Drawing plans, schematics, and diagrams indicate general location and arrangement of duct system. Indicated duct locations, configurations, and arrangements were used to size ducts and calculate friction loss for air-handling equipment sizing and for other design considerations. Install duct systems as indicated unless deviations to layout are approved on Shop Drawings and Coordination Drawings.

B. Install ducts according to SMACNA's "HVAC Duct Construction Standards - Metal and Flexible" unless otherwise indicated.

C. Install round ducts in maximum practical lengths.

D. Install ducts with fewest possible joints.

E. Install factory- or shop-fabricated fittings for changes in direction, size, and shape and for branch connections.

F. Unless otherwise indicated, install ducts vertically and horizontally, and parallel and perpendicular to building lines.

G. Install ducts close to walls, overhead construction, columns, and other structural and permanent enclosure elements of building.

H. Install ducts with a clearance of 1 inch, plus allowance for insulation thickness.

I. Route ducts to avoid passing through transformer vaults and electrical equipment rooms and enclosures.

J. Where ducts pass through non-fire-rated interior partitions and exterior walls and are exposed to view, cover the opening between the partition and duct or duct insulation with sheet metal flanges of same metal thickness as the duct. Overlap openings on four sides by at least 1-1/2 inches.

K. Where ducts pass through fire-rated interior partitions and exterior walls, install fire dampers. Comply with requirements in Section 233300 "Air Duct Accessories" for fire and smoke dampers.

L. Protect duct interiors from moisture, construction debris and dust, and other foreign materials. Comply with SMACNA's "IAQ Guidelines for Occupied Buildings Under Construction," Appendix G, "Duct Cleanliness for New Construction Guidelines."

3.2 INSTALLATION OF EXPOSED DUCTWORK

A. Protect ducts exposed in finished spaces from being dented, scratched, or damaged.

B. Trim duct sealants flush with metal. Create a smooth and uniform exposed bead. Do not use two-part tape sealing system.

C. Grind welds to provide smooth surface free of burrs, sharp edges, and weld splatter. When welding stainless steel with a No. 3 or 4 finish, grind the welds flush, polish the exposed welds, and treat the welds to remove discoloration caused by welding.

D. Maintain consistency, symmetry, and uniformity in the arrangement and fabrication of fittings, hangers and supports, duct accessories, and air outlets.

E. Repair or replace damaged sections and finished work that does not comply with these requirements.

3.3 DUCT SEALING

A. Seal ducts for duct static-pressure, seal classes, and leakage classes specified in "Duct Schedule" Article according to SMACNA's "HVAC Duct Construction Standards - Metal and Flexible."

B. Seal ducts to the following seal classes according to SMACNA's "HVAC Duct Construction Standards - Metal and Flexible":

1. Comply with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible."
2. Outdoor, Supply-Air Ducts: Seal Class A.
3. Outdoor, Exhaust Ducts: Seal Class C.
4. Outdoor, Return-Air Ducts: Seal Class C.
5. Unconditioned Space, Supply-Air Ducts in Pressure Classes 2-Inch wg and Lower: Seal Class B.
6. Unconditioned Space, Supply-Air Ducts in Pressure Classes Higher Than 2-Inch wg: Seal Class A.
7. Unconditioned Space, Exhaust Ducts: Seal Class C.
8. Unconditioned Space, Return-Air Ducts: Seal Class B.
9. Conditioned Space, Supply-Air Ducts in Pressure Classes 2-Inch wg and Lower: Seal Class C.
10. Conditioned Space, Supply-Air Ducts in Pressure Classes Higher Than 2-Inch wg: Seal Class B.
11. Conditioned Space, Exhaust Ducts: Seal Class B.
12. Conditioned Space, Return-Air Ducts: Seal Class C.

3.4 HANGER AND SUPPORT INSTALLATION

A. Comply with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible," Chapter 5, "Hangers and Supports."

B. Building Attachments: Concrete inserts, powder-actuated fasteners, or structural-steel fasteners appropriate for construction materials to which hangers are being attached.

1. Where practical, install concrete inserts before placing concrete.
2. Install powder-actuated concrete fasteners after concrete is placed and completely cured.
3. Use powder-actuated concrete fasteners for standard-weight aggregate concretes or for slabs more than 4 inches thick.
4. Do not use powder-actuated concrete fasteners for lightweight-aggregate concretes or for slabs less than 4 inches thick.
5. Do not use powder-actuated concrete fasteners for seismic restraints.

C. Hanger Spacing: Comply with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible," Table 5-1, "Rectangular Duct Hangers Minimum Size," and Table 5-2, "Minimum Hanger Sizes for Round Duct," for maximum hanger spacing; install hangers and supports within 24 inches of each elbow and within 48 inches of each branch intersection.

D. Hangers Exposed to View: Threaded rod and angle or channel supports.

E. Support vertical ducts with steel angles or channel secured to the sides of the duct with welds, bolts, sheet metal screws, or blind rivets; support at each floor and at a maximum intervals of 16 feet.

F. Install upper attachments to structures. Select and size upper attachments with pull-out, tension, and shear capacities appropriate for supported loads and building materials where used.

3.5 SEISMIC-RESTRAINT-DEVICE INSTALLATION

A. Install ducts with hangers and braces designed to support the duct and to restrain against seismic forces required by applicable building codes. Comply with SMACNA's "Seismic Restraint Manual: Guidelines for Mechanical Systems" and ASCE/SEI 7.

1. Space lateral supports a maximum of 40 feet o.c., and longitudinal supports a maximum of 80 feet o.c.
2. Brace a change of direction longer than 12 feet.

B. Select seismic-restraint devices with capacities adequate to carry present and future static and seismic loads.

C. Install cables so they do not bend across edges of adjacent equipment or building structure.

D. Install cable restraints on ducts that are suspended with vibration isolators.

E. Install seismic-restraint devices using methods approved by the Office of Statewide Health Planning and Development for the State of California.

F. Attachment to Structure: If specific attachment is not indicated, anchor bracing and restraints to structure, to flanges of beams, to upper truss chords of bar joists, or to concrete members.

G. Drilling for and Setting Anchors:

1. Identify position of reinforcing steel and other embedded items prior to drilling holes for anchors. Do not damage existing reinforcement or embedded items during drilling. Notify the Architect if reinforcing steel or other embedded items are encountered during

drilling. Locate and avoid prestressed tendons, electrical and telecommunications conduit, and gas lines.

2. Do not drill holes in concrete or masonry until concrete, mortar, or grout has achieved full design strength.
3. Wedge Anchors: Protect threads from damage during anchor installation. Heavy-duty sleeve anchors shall be installed with sleeve fully engaged in the structural element to which anchor is to be fastened.
4. Set anchors to manufacturer's recommended torque, using a torque wrench.
5. Install zinc-coated steel anchors for interior applications and stainless-steel anchors for applications exposed to weather.

3.6 CONNECTIONS

A. Make connections to equipment with flexible connectors complying with Section 233300 "Air Duct Accessories."

B. Comply with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible" for branch, outlet and inlet, and terminal unit connections.

3.7 PAINTING

A. Paint interior of metal ducts that are visible through registers and grilles and that do not have duct liner. Apply one coat of flat, black, latex paint over a compatible galvanized-steel primer. Paint materials and application requirements are specified in Section 099113 "Exterior Painting" and Section 099123 "Interior Painting."

3.8 FIELD QUALITY CONTROL

A. Perform tests and inspections.

B. Leakage Tests:

1. Comply with SMACNA's "HVAC Air Duct Leakage Test Manual." Submit a test report for each test.
2. Test the following systems:

    a. Ducts with a Pressure Class Higher Than 3-Inch wg: Test representative duct sections totaling no less than 25 percent of total installed duct area for each designated pressure class.
    b. Supply, Return, Outdoor Air, Exhaust Ducts with a Pressure Class of 2-Inch wg or Higher: Test representative duct sections totaling no less than 100 percent of total installed duct area for each designated pressure class.

3. Disassemble, reassemble, and seal segments of systems to accommodate leakage testing and for compliance with test requirements.
4. Test for leaks before applying external insulation.
5. Conduct tests at static pressures equal to maximum design pressure of system or section being tested. If static-pressure classes are not indicated, test system at maximum system design pressure. Do not pressurize systems above maximum design operating pressure.
6. Give seven days' advance notice for testing.

C. Duct System Cleanliness Tests:

1. Visually inspect duct system to ensure that no visible contaminants are present.
2. Test sections of metal duct system, chosen randomly by Owner, for cleanliness according to "Vacuum Test" in NADCA ACR, "Assessment, Cleaning and Restoration of HVAC Systems."

   a. Acceptable Cleanliness Level: Net weight of debris collected on the filter media shall not exceed 0.75 mg/100 sq. cm.

D. Duct system will be considered defective if it does not pass tests and inspections.

E. Prepare test and inspection reports.

3.9 DUCT CLEANING

A. Clean new and existing duct system(s) before testing, adjusting, and balancing.

B. Use service openings for entry and inspection.

1. Create new openings and install access panels appropriate for duct static-pressure class if required for cleaning access. Provide insulated panels for insulated or lined duct. Patch insulation and liner as recommended by duct liner manufacturer. Comply with Section 233300 "Air Duct Accessories" for access panels and doors.
2. Disconnect and reconnect flexible ducts as needed for cleaning and inspection.
3. Remove and reinstall ceiling to gain access during the cleaning process.

C. Particulate Collection and Odor Control:

1. When venting vacuuming system inside the building, use HEPA filtration with 99.97 percent collection efficiency for 0.3-micron-size (or larger) particles.
2. When venting vacuuming system to outdoors, use filter to collect debris removed from HVAC system, and locate exhaust downwind and away from air intakes and other points of entry into building.

D. Clean the following components by removing surface contaminants and deposits:

1. Air outlets and inlets (registers, grilles, and diffusers).
2. Supply, return, and exhaust fans including fan housings, plenums (except ceiling supply and return plenums), scrolls, blades or vanes, shafts, baffles, dampers, and drive assemblies.
3. Air-handling unit internal surfaces and components including mixing box, coil section, air wash systems, spray eliminators, condensate drain pans, humidifiers and dehumidifiers, filters and filter sections, and condensate collectors and drains.
4. Coils and related components.
5. Return-air ducts, dampers, actuators, and turning vanes except in ceiling plenums and mechanical equipment rooms.
6. Supply-air ducts, dampers, actuators, and turning vanes.
7. Dedicated exhaust and ventilation components and makeup air systems.

E. Mechanical Cleaning Methodology:

1. Clean metal duct systems using mechanical cleaning methods that extract contaminants from within duct systems and remove contaminants from building.

2. Use vacuum-collection devices that are operated continuously during cleaning. Connect vacuum device to downstream end of duct sections so areas being cleaned are under negative pressure.
3. Use mechanical agitation to dislodge debris adhered to interior duct surfaces without damaging integrity of metal ducts, duct liner, or duct accessories.
4. Clean fibrous-glass duct liner with HEPA vacuuming equipment; do not permit duct liner to get wet. Replace fibrous-glass duct liner that is damaged, deteriorated, or delaminated or that has friable material, mold, or fungus growth.
5. Clean coils and coil drain pans according to NADCA 1992. Keep drain pan operational. Rinse coils with clean water to remove latent residues and cleaning materials; comb and straighten fins.
6. Provide drainage and cleanup for wash-down procedures.
7. Antimicrobial Agents and Coatings: Apply EPA-registered antimicrobial agents if fungus is present. Apply antimicrobial agents according to manufacturer's written instructions after removal of surface deposits and debris.

3.10 START UP

A. Air Balance: Comply with requirements in Section 230593 "Testing, Adjusting, and Balancing for HVAC."

3.11 DUCT SCHEDULE

A. Fabricate ducts with galvanized sheet steel except as otherwise indicated.

B. Supply Ducts:

1. Ducts Connected to Fan Coil Units, Furnaces, Heat Pumps, and Terminal Units

   a. Pressure Class: Positive 2-inch wg.
   b. Minimum SMACNA Seal Class: C.
   c. SMACNA Leakage Class for Rectangular: 24.
   d. SMACNA Leakage Class for Round and Flat Oval: 12.

2. Ducts Connected to Air-Handling Units:

   a. Pressure Class: Positive 2-inch wg.
   b. Minimum SMACNA Seal Class: C.
   c. SMACNA Leakage Class for Rectangular: 24.
   d. SMACNA Leakage Class for Round and Flat Oval: 12.

3. Ducts Connected to Equipment Not Listed Above:

   a. Pressure Class: Positive 2-inch wg.
   b. Minimum SMACNA Seal Class: C.
   c. SMACNA Leakage Class for Rectangular: 24.
   d. SMACNA Leakage Class for Round and Flat Oval: 12.

C. Return Ducts:

1. Ducts Connected to Fan Coil Units, Furnaces, Heat Pumps, and Terminal Units:

   a. Pressure Class: Positive or negative 2-inch wg.

b. Minimum SMACNA Seal Class: C.
c. SMACNA Leakage Class for Rectangular: 24.
d. SMACNA Leakage Class for Round and Flat Oval: 12.

2. Ducts Connected to Air-Handling Units:

a. Pressure Class: Positive or negative 2-inch wg.
b. Minimum SMACNA Seal Class: C.
c. SMACNA Leakage Class for Rectangular: 24.
d. SMACNA Leakage Class for Round and Flat Oval: 12

3. Ducts Connected to Equipment Not Listed Above:

a. Pressure Class: Positive or negative 2-inch wg.
b. Minimum SMACNA Seal Class: C.
c. SMACNA Leakage Class for Rectangular: 24.
d. SMACNA Leakage Class for Round and Flat Oval: 12

D. Exhaust Ducts:

1. Ducts Connected to Fans Exhausting (ASHRAE 62.1, Class 1 and 2) Air:

a. Pressure Class: Negative 2-inch wg.
b. Minimum SMACNA Seal Class: C.
c. SMACNA Leakage Class for Rectangular: 24.
d. SMACNA Leakage Class for Round and Flat Oval: 12

2. Ducts Connected to Air-Handling Units:

a. Pressure Class: Positive or negative 2-inch wg.
b. Minimum SMACNA Seal Class: C.
c. SMACNA Leakage Class for Rectangular: 24.
d. SMACNA Leakage Class for Round and Flat Oval: 12

3. Ducts Connected to Equipment Not Listed Above:

a. Pressure Class: Positive or negative 2-inch wg.
b. Minimum SMACNA Seal Class: C.
c. SMACNA Leakage Class for Rectangular: 24.
d. SMACNA Leakage Class for Round and Flat Oval: 12

E. Outdoor-Air (Not Filtered, Heated, or Cooled) Ducts:

1. Ducts Connected to Fan Coil Units, Furnaces, Heat Pumps, and Terminal Units:

a. Pressure Class: Positive or negative 2-inch wg.
b. Minimum SMACNA Seal Class: C.
c. SMACNA Leakage Class for Rectangular: 24.
d. SMACNA Leakage Class for Round and Flat Oval: 12

2. Ducts Connected to Air-Handling Units:

a. Pressure Class: Positive or negative 2-inch wg.
b. Minimum SMACNA Seal Class: C.
c. SMACNA Leakage Class for Rectangular: 24.

d. SMACNA Leakage Class for Round and Flat Oval: 12

3. Ducts Connected to Equipment Not Listed Above:

a. Pressure Class: Positive or negative 2-inch wg.
b. Minimum SMACNA Seal Class: C.
c. SMACNA Leakage Class for Rectangular: 24.
d. SMACNA Leakage Class for Round and Flat Oval: 12

F. Intermediate Reinforcement:

1. Galvanized-Steel Ducts: Galvanized steel.

G. Liner:

1. Supply and Return Air Ducts and Plenums: Fibrous glass, Type I, 1-1/2 inches thick.
2. Transfer Ducts: Fibrous glass, Type I, 2 inches thick.

H. Elbow Configuration:

1. Rectangular Duct: Comply with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible," Figure 4-2, "Rectangular Elbows."

a. Velocity 1000 fpm or Lower:

1) Radius Type RE 1 with minimum 0.5 radius-to-diameter ratio.
2) Mitered Type RE 4 without vanes.

b. Velocity 1000 to 1500 fpm:

1) Radius Type RE 1 with minimum 1.0 radius-to-diameter ratio.
2) Radius Type RE 3 with minimum 0.5 radius-to-diameter ratio and two vanes.
3) Mitered Type RE 2 with vanes complying with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible," Figure 4-3, "Vanes and Vane Runners," and Figure 4-4, "Vane Support in Elbows."

c. Velocity 1500 fpm or Higher:

1) Radius Type RE 1 with minimum 1.5 radius-to-diameter ratio.
2) Radius Type RE 3 with minimum 1.0 radius-to-diameter ratio and two vanes.
3) Mitered Type RE 2 with vanes complying with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible," Figure 4-3, "Vanes and Vane Runners," and Figure 4-4, "Vane Support in Elbows."

2. Rectangular Duct: Comply with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible," Figure 4-2, "Rectangular Elbows."

a. Radius Type RE 1 with minimum 1.5 radius-to-diameter ratio.
b. Radius Type RE 3 with minimum 1.0 radius-to-diameter ratio and two vanes.
c. Mitered Type RE 2 with vanes complying with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible," Figure 4-3, "Vanes and Vane Runners," and Figure 4-4, "Vane Support in Elbows."

3. Round Duct: Comply with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible," Figure 3-4, "Round Duct Elbows."

a. Minimum Radius-to-Diameter Ratio and Elbow Segments: Comply with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible," Table 3-1, "Mitered Elbows." Elbows with less than 90-degree change of direction have proportionately fewer segments.

1) Velocity 1000 fpm or Lower: 0.5 radius-to-diameter ratio and three segments for 90-degree elbow.
2) Velocity 1000 to 1500 fpm: 1.0 radius-to-diameter ratio and four segments for 90-degree elbow.
3) Velocity 1500 fpm or Higher: 1.5 radius-to-diameter ratio and five segments for 90-degree elbow.
4) Radius-to Diameter Ratio: 1.5.

b. Round Elbows, 12 Inches and Smaller in Diameter: Stamped or pleated.
c. Round Elbows, 14 Inches and Larger in Diameter: Standing seam.

I. Branch Configuration:

1. Rectangular Duct: Comply with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible," Figure 4-6, "Branch Connection."

a. Rectangular Main to Rectangular Branch: 45-degree entry.
b. Rectangular Main to Round Branch: Spin in.

2. Round and Flat Oval: Comply with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible," Figure 3-5, "90 Degree Tees and Laterals," and Figure 3-6, "Conical Tees." Saddle taps are permitted in existing duct.

a. Velocity 1000 fpm or Lower: 90-degree tap.
b. Velocity 1000 to 1500 fpm: Conical tap.
c. Velocity 1500 fpm or Higher: 45-degree lateral.

END OF SECTION 233113

SECTION 23 33 00 - AIR DUCT ACCESSORIES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section Includes:

1. Backdraft and pressure relief dampers.
2. Barometric relief dampers.
3. Manual volume dampers.
4. Control dampers.
5. Flange connectors.
6. Turning vanes.
7. Remote damper operators.
8. Duct-mounted access doors.
9. Flexible connectors.
10. Flexible ducts.
11. Duct accessory hardware.

1.3 ACTION SUBMITTALS

A. Product Data: For each type of product.

1. For duct silencers, include pressure drop and dynamic insertion loss data. Include breakout noise calculations for high transmission loss casings.

B. Shop Drawings: For duct accessories. Include plans, elevations, sections, details and attachments to other work.

1. Detail duct accessories fabrication and installation in ducts and other construction. Include dimensions, weights, loads, and required clearances; and method of field assembly into duct systems and other construction. Include the following:

a. Special fittings.
b. Manual volume damper installations.
c. Control-damper installations.
d. Fire-damper, smoke-damper, combination fire- and smoke-damper, ceiling, and corridor damper installations, including sleeves; and duct-mounted access doors and remote damper operators.
e. Duct security bars.
f. Wiring Diagrams: For power, signal, and control wiring.

1.4 INFORMATIONAL SUBMITTALS

A. Coordination Drawings: Reflected ceiling plans, drawn to scale, on which ceiling-mounted access panels and access doors required for access to duct accessories are shown and coordinated with each other, using input from Installers of the items involved.

B. Source quality-control reports.

1.5 CLOSEOUT SUBMITTALS

A. Operation and Maintenance Data: For air duct accessories to include in operation and maintenance manuals.

PART 2 - PRODUCTS

2.1 ASSEMBLY DESCRIPTION

A. Comply with NFPA 90A, "Installation of Air Conditioning and Ventilating Systems," and with NFPA 90B, "Installation of Warm Air Heating and Air Conditioning Systems."

B. Comply with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible" for acceptable materials, material thicknesses, and duct construction methods unless otherwise indicated. Sheet metal materials shall be free of pitting, seam marks, roller marks, stains, discolorations, and other imperfections.

2.2 MATERIALS

A. Galvanized Sheet Steel: Comply with ASTM A 653/A 653M.

1. Galvanized Coating Designation: G90.
2. Exposed-Surface Finish: Mill phosphatized.

B. Stainless-Steel Sheets: Comply with ASTM A 480/A 480M, Type 304, and having a No. 2 finish for concealed ducts and finish for exposed ducts.

C. Reinforcement Shapes and Plates: Galvanized-steel reinforcement where installed on galvanized sheet metal ducts; compatible materials for aluminum and stainless-steel ducts.

D. Tie Rods: Galvanized steel, 1/4-inch minimum diameter for lengths 36 inches or less; 3/8-inch minimum diameter for lengths longer than 36 inches.

2.3 BACKDRAFT AND PRESSURE RELIEF DAMPERS

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1. Greenheck Fan Corporation.
2. Pottorff.
3. Ruskin Company.

B. Description: Gravity balanced.

C. Maximum Air Velocity: 2500 fpm.

D. Maximum System Pressure: 2-inch wg.

E. Frame: Hat-shaped, 18-gage galvanized sheet steel, with welded corners or mechanically attached and mounting flange.

F. Blades: Multiple single-piece blades, center pivoted, maximum 6-inch width, 0.025-inch- thick, roll-formed aluminum with sealed edges.

G. Blade Action: Parallel.

H. Blade Seals: Extruded vinyl, mechanically locked.

I. Blade Axles:

1. Material: Plated steel.
2. Diameter: 0.20 inch.

J. Tie Bars and Brackets: Galvanized steel.

K. Return Spring: Adjustable tension.

L. Bearings: Synthetic pivot bushings.

M. Accessories:

1. Adjustment device to permit setting for varying differential static pressure.
2. Counterweights and spring-assist kits for vertical airflow installations.
3. Chain pulls.
4. Screen Mounting: Front mounted in sleeve.

   a. Sleeve Thickness: 20 gage minimum.
   b. Sleeve Length: 6 inches minimum.

5. Screen Mounting: Rear mounted.
6. Screen Material: Galvanized steel.
7. Screen Type: Bird.
8. 90-degree stops.

2.4 BAROMETRIC RELIEF DAMPERS

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1. Greenheck Fan Corporation.
2. Pottorff.
3. Ruskin Company.

B. Suitable for horizontal or vertical mounting.

C. Maximum Air Velocity: 2000 fpm.

D. Maximum System Pressure: 2-inch wg.

E. Frame: Hat-shaped, 16-gage, galvanized sheet steel with welded corners or mechanically attached and mounting flange.

F. Blades:

1. Multiple, 0.025-inch- thick, roll-formed alumrinum.
2. Maximum Width: 6 inches.
3. Action: Parallel.
4. Balance: Gravity.
5. Eccentrically pivoted.

G. Blade Seals: Vinyl.

H. Blade Axles: Plated steel.

I. Tie Bars and Brackets:

1. Material: Galvanized steel.
2. Rattle free with 90-degree stop.

J. Return Spring: Adjustable tension.

K. Bearings: Ball.

L. Accessories:

1. Flange on intake.
2. Adjustment device to permit setting for varying differential static pressures.

2.5 MANUAL VOLUME DAMPERS

A. Standard, Steel, Manual Volume Dampers:

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

a. Nailor Industries Inc.
b. Pottorff.
c. Ruskin Company.
d. Trox USA Inc.

2. Standard leakage rating.
3. Suitable for horizontal or vertical applications.
4. Frames:

a. Frame: Hat-shaped, 20-gage, galvanized sheet steel.
b. Mitered and welded corners.
c. Flanges for attaching to walls and flangeless frames for installing in ducts.

5. Blades:

a. Multiple or single blade.

b. Parallel- or opposed-blade design.
c. Stiffen damper blades for stability.
d. Galvanized-steel, 0.064 inch thick.

6. Blade Axles: Plated steel.
7. Bearings:

a. Molded synthetic.
b. Dampers in ducts with pressure classes of 3-inch wg or less shall have axles full length of damper blades and bearings at both ends of operating shaft.

8. Tie Bars and Brackets: Galvanized steel.

2.6 CONTROL DAMPERS

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1. Greenheck Fan Corporation.
2. Pottorff.
3. Ruskin Company.
4. Young Regulator Company.

B. Low-leakage rating, with linkage outside airstream, and bearing AMCA's Certified Ratings Seal for both air performance and air leakage.

C. Frames:

1. Hat shaped.
2. 16-gage, galvanized sheet steel.
3. Reinforced corners.

D. Blades:

1. Multiple blade with maximum blade width of 6 inches.
2. Opposed-blade design.
3. Aluminum.
4. 0.063 inch thick single skin.
5. Blade Edging: TPE.

E. Blade Axles: 1/2-inch- diameter; plated steel; blade-linkage hardware of zinc-plated steel and brass; ends sealed against blade bearings.

1. Operating Temperature Range: From minus 40 to plus 200 deg F.

F. Bearings:

1. Molded synthetic.
2. Dampers in ducts with pressure classes of 3-inch wg or less shall have axles full length of damper blades and bearings at both ends of operating shaft.
3. Thrust bearings at each end of every blade.

2.7 FLANGE CONNECTORS

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1. Ductmate Industries, Inc.
2. Nexus PDQ; Division of Shilco Holdings Inc.
3. Ward Industries, Inc.; a division of Hart & Cooley, Inc.

B. Description: Roll-formed, factory-fabricated, slide-on transverse flange connectors, gaskets, and components.

C. Material: Galvanized steel.

D. Gage and Shape: Match connecting ductwork.

2.8 TURNING VANES

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1. Ductmate Industries, Inc.
2. Duro Dyne Inc.
3. METALAIRE, Inc.
4. SEMCO Incorporated.

B. Manufactured Turning Vanes for Metal Ducts: Curved blades of galvanized sheet steel; support with bars perpendicular to blades set; set into vane runners suitable for duct mounting.

1. Acoustic Turning Vanes: Fabricate airfoil-shaped aluminum extrusions with perforated faces and fibrous-glass fill.

C. Manufactured Turning Vanes for Nonmetal Ducts: Fabricate curved blades of resin-bonded fiberglass with acrylic polymer coating; support with bars perpendicular to blades set; set into vane runners suitable for duct mounting.

D. General Requirements: Comply with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible"; Figures 4-3, "Vanes and Vane Runners," and 4-4, "Vane Support in Elbows."

E. Vane Construction: Double wall.

2.9 REMOTE DAMPER OPERATORS

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1. Pottorff.
2. Ventfabrics, Inc.
3. Young Regulator Company.

B. Description: Cable system designed for remote manual damper adjustment.

C. Tubing: Galvanized spiral wire sheath.

D. Cable: Stainless steel.

E. Wall-Box Mounting: Recessed.

F. Wall-Box Cover-Plate Material: Steel.

2.10 DUCT-MOUNTED ACCESS DOORS

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1. Ductmate Industries, Inc.
2. Greenheck Fan Corporation.
3. Pottorff.

B. Duct-Mounted Access Doors: Fabricate access panels according to SMACNA's "HVAC Duct Construction Standards - Metal and Flexible"; Figures 7-2, "Duct Access Doors and Panels," and 7-3, "Access Doors - Round Duct."

1. Door:

   a. Double wall, rectangular.
   b. Galvanized sheet metal with insulation fill and thickness as indicated for duct pressure class.
   c. Vision panel.
   d. Hinges and Latches: 1-by-1-inch butt or piano hinge and cam latches.
   e. Fabricate doors airtight and suitable for duct pressure class.

2. Frame: Galvanized sheet steel, with bend-over tabs and foam gaskets.
3. Number of Hinges and Locks:

   a. Access Doors Less Than 12 Inches Square: No hinges and two sash locks.
   b. Access Doors up to 18 Inches Square: Continuous and two sash locks.
   c. Access Doors up to 24 by 48 Inches: Continuous and two compression latches with outside and inside handles.
   d. Access Doors Larger Than 24 by 48 Inches: Continuous and two compression latches with outside and inside handles.

C. Pressure Relief Access Door:

1. Door and Frame Material: Galvanized sheet steel.
2. Door: Single wall or double wall with insulation fill with metal thickness applicable for duct pressure class.
3. Operation: Open outward for positive-pressure ducts and inward for negative-pressure ducts.
4. Factory set.
5. Doors close when pressures are within set-point range.
6. Hinge: Continuous piano.
7. Latches: Cam.
8. Seal: Neoprene or foam rubber.
9. Insulation Fill: 1-inch- thick, fibrous-glass or polystyrene-foam board.

2.11 DUCT ACCESS PANEL ASSEMBLIES

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1. Ductmate Industries, Inc.
2. Flame Gard, Inc.
3. 3M.

B. Labeled according to UL 1978 by an NRTL.

C. Panel and Frame: Minimum thickness 11-gage carbon steel.

D. Fasteners: Carbon steel. Panel fasteners shall not penetrate duct wall.

E. Gasket: Comply with NFPA 96; grease-tight, high-temperature ceramic fiber, rated for minimum 2000 deg F.

F. Minimum Pressure Rating: 10-inch wg, positive or negative.

2.12 FLEXIBLE CONNECTORS

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1. Ductmate Industries, Inc.
2. Duro Dyne Inc.
3. Ward Industries, Inc.; a division of Hart & Cooley, Inc.

B. Materials: Flame-retardant or noncombustible fabrics.

C. Coatings and Adhesives: Comply with UL 181, Class 1.

D. Metal-Edged Connectors: Factory fabricated with a fabric strip 3-1/2 inches wide attached to two strips of 2-3/4-inch- wide, 0.028-inch- thick, galvanized sheet steel or 0.032-inch- thick aluminum sheets. Provide metal compatible with connected ducts.

E. Indoor System, Flexible Connector Fabric: Glass fabric double coated with neoprene.

1. Minimum Weight: 26 oz./sq. yd..
2. Tensile Strength: 480 lbf/inch in the warp and 360 lbf/inch in the filling.
3. Service Temperature: Minus 40 to plus 200 deg F.

F. Outdoor System, Flexible Connector Fabric: Glass fabric double coated with weatherproof, synthetic rubber resistant to UV rays and ozone.

1. Minimum Weight: 24 oz./sq. yd..
2. Tensile Strength: 530 lbf/inch in the warp and 440 lbf/inch in the filling.
3. Service Temperature: Minus 50 to plus 250 deg F.

G. High-Temperature System, Flexible Connectors: Glass fabric coated with silicone rubber.

1. Minimum Weight: 16 oz./sq. yd..
2. Tensile Strength: 285 lbf/inch in the warp and 185 lbf/inch in the filling.

3. Service Temperature: Minus 67 to plus 500 deg F.

H. High-Corrosive-Environment System, Flexible Connectors: Glass fabric with chemical-resistant coating.

1. Minimum Weight: 14 oz./sq. yd..
2. Tensile Strength: 450 lbf/inch in the warp and 340 lbf/inch in the filling.
3. Service Temperature: Minus 67 to plus 500 deg F.

I. Thrust Limits: Combination coil spring and elastomeric insert with spring and insert in compression, and with a load stop. Include rod and angle-iron brackets for attaching to fan discharge and duct.

1. Frame: Steel, fabricated for connection to threaded rods and to allow for a maximum of 30 degrees of angular rod misalignment without binding or reducing isolation efficiency.
2. Outdoor Spring Diameter: Not less than 80 percent of the compressed height of the spring at rated load.
3. Minimum Additional Travel: 50 percent of the required deflection at rated load.
4. Lateral Stiffness: More than 80 percent of rated vertical stiffness.
5. Overload Capacity: Support 200 percent of rated load, fully compressed, without deformation or failure.
6. Elastomeric Element: Molded, oil-resistant rubber or neoprene.
7. Coil Spring: Factory set and field adjustable for a maximum of 1/4-inch movement at start and stop.

2.13 FLEXIBLE DUCTS

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1. Flexmaster U.S.A., Inc.
2. McGill AirFlow LLC.
3. Ward Industries, Inc.; a division of Hart & Cooley, Inc.

B. Insulated, Flexible Duct: UL 181, Class 1, polyethylene film supported by helically wound, galvanized-steel wire; fibrous-glass insulation; aluminized vapor-barrier film.

1. Pressure Rating: 10-inch wg positive and 1.0-inch wg negative.
2. Maximum Air Velocity: 5500 fpm.
3. Temperature Range: Minus 10 to plus 160 deg F.
4. Insulation R-value: Comply with ASHRAE/IESNA 90.1.

C. Flexible Duct Connectors:

1. Clamps: Stainless-steel band with cadmium-plated hex screw to tighten band with a worm-gear action in sizes 3 through 18 inches, to suit duct size.

2. Non-Clamp Connectors: Adhesive plus sheet metal screws.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Install duct accessories according to applicable details in SMACNA's "HVAC Duct Construction Standards - Metal and Flexible" for metal ducts and in NAIMA AH116, "Fibrous Glass Duct Construction Standards," for fibrous-glass ducts.

B. Install duct accessories of materials suited to duct materials; use galvanized-steel accessories in galvanized-steel and fibrous-glass ducts, stainless-steel accessories in stainless-steel ducts, and aluminum accessories in aluminum ducts.

C. Install backdraft dampers at inlet of exhaust fans or exhaust ducts as close as possible to exhaust fan unless otherwise indicated.

D. Install volume dampers at points on supply, return, and exhaust systems where branches extend from larger ducts. Where dampers are installed in ducts having duct liner, install dampers with hat channels of same depth as liner, and terminate liner with nosing at hat channel.

1. Install steel volume dampers in steel ducts.
2. Install aluminum volume dampers in aluminum ducts.

E. Set dampers to fully open position before testing, adjusting, and balancing.

F. Install test holes at fan inlets and outlets and elsewhere as indicated.

G. Install fire and smoke dampers according to UL listing.

H. Connect ducts to duct silencers rigidly.

I. Install duct access doors on sides of ducts to allow for inspecting, adjusting, and maintaining accessories and equipment at the following locations:

1. On both sides of duct coils.
2. Upstream from duct filters.
3. At outdoor-air intakes and mixed-air plenums.
4. At drain pans and seals.
5. Downstream from manual volume dampers, control dampers, backdraft dampers, and equipment.
6. Adjacent to and close enough to fire or smoke dampers, to reset or reinstall fusible links. Access doors for access to fire or smoke dampers having fusible links shall be pressure relief access doors and shall be outward operation for access doors installed upstream from dampers and inward operation for access doors installed downstream from dampers.
7. At each change in direction and at maximum 50-foot spacing.
8. Upstream from turning vanes.
9. Upstream or downstream from duct silencers.
10. Control devices requiring inspection.
11. Elsewhere as indicated.

J. Install access doors with swing against duct static pressure.

K. Access Door Sizes:

1. One-Hand or Inspection Access: 8 by 5 inches.
2. Two-Hand Access: 12 by 6 inches.
3. Head and Hand Access: 18 by 10 inches.
4. Head and Shoulders Access: 21 by 14 inches.
5. Body Access: 25 by 14 inches.
6. Body plus Ladder Access: 25 by 17 inches.

L. Label access doors according to Section 230553 "Identification for HVAC Piping and Equipment" to indicate the purpose of access door.

M. Install flexible connectors to connect ducts to equipment.

N. For fans developing static pressures of 5-inch wg and more, cover flexible connectors with loaded vinyl sheet held in place with metal straps.

O. Connect diffusers to ducts with maximum 60-inch lengths of flexible duct clamped or strapped in place.

P. Connect flexible ducts to metal ducts with draw bands.

Q. Install duct test holes where required for testing and balancing purposes.

R. Install thrust limits at centerline of thrust, symmetrical on both sides of equipment. Attach thrust limits at centerline of thrust and adjust to a maximum of 1/4-inch movement during start and stop of fans.

3.2 FIELD QUALITY CONTROL

A. Tests and Inspections:

1. Operate dampers to verify full range of movement.
2. Inspect locations of access doors and verify that purpose of access door can be performed.
3. Operate fire, smoke, and combination fire and smoke dampers to verify full range of movement and verify that proper heat-response device is installed.
4. Inspect turning vanes for proper and secure installation.
5. Operate remote damper operators to verify full range of movement of operator and damper.

END OF SECTION 233300

SECTION 23 34 23 - HVAC POWER VENTILATORS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section Includes:

1. Utility set fans.
2. Ceiling-mounted ventilators.
3. In-line centrifugal fans.

1.3 PERFORMANCE REQUIREMENTS

A. Project Altitude: Base fan-performance ratings on actual project site elevations.

B. Operating Limits: Classify according to AMCA 99.

1.4 ACTION SUBMITTALS

A. Product Data: For each type of product indicated. Include rated capacities, operating characteristics, and furnished specialties and accessories. Also include the following:

1. Certified fan performance curves with system operating conditions indicated.
2. Certified fan sound-power ratings.
3. Motor ratings and electrical characteristics, plus motor and electrical accessories.
4. Material thickness and finishes, including color charts.
5. Dampers, including housings, linkages, and operators.
6. Roof curbs.
7. Fan speed controllers.

B. Shop Drawings: Include plans, elevations, sections, details, and attachments to other work.

1. Detail equipment assemblies and indicate dimensions, weights, loads, required clearances, method of field assembly, components, and location and size of each field connection.
2. Wiring Diagrams: For power, signal, and control wiring.

1.5 INFORMATIONAL SUBMITTALS

A. Coordination Drawings: Reflected ceiling plans and other details, drawn to scale, on which the following items are shown and coordinated with each other, using input from Installers of the items involved:

1. Roof framing and support members relative to duct penetrations.
2. Ceiling suspension assembly members.
3. Size and location of initial access modules for acoustical tile.
4. Ceiling-mounted items including light fixtures, diffusers, grilles, speakers, sprinklers, access panels, and special moldings.

B. Field quality-control reports.

1.6 CLOSEOUT SUBMITTALS

A. Operation and Maintenance Data: For power ventilators to include in emergency, operation, and maintenance manuals.

1.7 MAINTENANCE MATERIAL SUBMITTALS

A. Furnish extra materials that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.

1. Belts: One set for each belt-driven unit.

1.8 QUALITY ASSURANCE

A. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.

B. AMCA Compliance: Fans shall have AMCA-Certified performance ratings and shall bear the AMCA-Certified Ratings Seal.

C. UL Standards: Power ventilators shall comply with UL 705. Power ventilators for use for restaurant kitchen exhaust shall also comply with UL 762.

1.9 COORDINATION

A. Coordinate size and location of structural-steel support members.

B. Coordinate sizes and locations of concrete bases with actual equipment provided.

C. Coordinate sizes and locations of roof curbs, equipment supports, and roof penetrations with actual equipment provided.

PART 2 - PRODUCTS

2.1 UTILITY SET FANS

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1. Greenheck Fan Corporation.
2. Loren Cook Company.

3. Aerovent; a division of Twin City Fan Companies, Ltd.

B. Housing: Fabricated of galvanized steel with side sheets fastened with a deep lock seam or welded to scroll sheets.

1. Housing Discharge Arrangement: Adjustable to eight standard positions.

C. Fan Wheels: Single-width, single inlet; welded to cast-iron or cast-steel hub and spun-steel inlet cone, with hub keyed to shaft.

1. Blade Materials: Steel.
2. Blade Type: Backward inclined.

D. Fan Shaft: Turned, ground, and polished steel; keyed to wheel hub.

E. Shaft Bearings: Prelubricated and sealed, self-aligning, pillow-block-type ball bearings with ABMA 9, L_{50} of 200,000 hours.

1. Extend grease fitting to accessible location outside of unit.

F. Belt Drives:

1. Factory mounted, with final alignment and belt adjustment made after installation
2. Service Factor Based on Fan Motor Size: 1.5.
3. Motor Pulleys: Adjustable pitch for use with motors through **5** hp; fixed pitch for use with larger motors. Select pulley so pitch adjustment is at the middle of adjustment range at fan design conditions.
4. Belts: Oil resistant, nonsparking, and nonstatic; matched sets for multiple belt drives.
5. Belt Guards: Fabricate of steel for motors mounted on outside of fan cabinet.

G. Accessories:

1. Inlet and Outlet: Flanged.
2. Companion Flanges: Rolled flanges for duct connections of same material as housing.
3. Backdraft Dampers: Gravity actuated with counterweight and interlocking aluminum blades with felt edges in steel frame installed on fan discharge.
4. Access Door: Gasketed door in scroll with latch-type handles.
5. Inlet Screens: Removable wire mesh.
6. Drain Connections: NPS 3/4 threaded coupling drain connection installed at lowest point of housing.
7. Weather Hoods: Weather resistant with stamped vents over motor and drive compartment.

2.2 CEILING-MOUNTED VENTILATORS

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1. Panasonic
2. Greenheck Fan Corporation.
3. Loren Cook Company.
4. Aerovent; a division of Twin City Fan Companies, Ltd.

B. Housing: Steel, lined with acoustical insulation.

C. Fan Wheel: Centrifugal wheels directly mounted on motor shaft. Fan shrouds, motor, and fan wheel shall be removable for service.

D. Grille: Plastic or painted aluminum, louvered grille with flange on intake and thumbscrew attachment to fan housing.

E. Electrical Requirements: Junction box for electrical connection on housing and receptacle for motor plug-in.

F. Accessories:

1. Variable-Speed Controller: Solid-state control to reduce speed from 100 to less than 50 percent.
2. Manual Starter Switch: Single-pole rocker switch assembly with cover and pilot light.
3. Time-Delay Switch: Assembly with single-pole rocker switch, timer, and cover plate.
4. Motion Sensor: Motion detector with adjustable shutoff timer.
5. Ceiling Radiation Damper: Fire-rated assembly with ceramic blanket, stainless-steel springs, and fusible link.
6. Filter: Washable aluminum to fit between fan and grille.
7. Isolation: Rubber-in-shear vibration isolators.
8. Manufacturer's standard roof jack or wall cap, and transition fittings.

2.3 IN-LINE CENTRIFUGAL FANS

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1. Fantech
2. Loren Cook Company
3. Aerovent; a division of Twin City Fan Companies, Ltd.

B. Housing: Split, spun aluminum with aluminum straightening vanes, inlet and outlet flanges, and support bracket adaptable to floor, side wall, or ceiling mounting.

C. Direct-Drive Units: Motor mounted in airstream, factory wired to disconnect switch located on outside of fan housing; with wheel, inlet cone, and motor on swing-out service door.

D. Belt-Driven Units: Motor mounted on adjustable base, with adjustable sheaves, enclosure around belts within fan housing, and lubricating tubes from fan bearings extended to outside of fan housing.

E. Fan Wheels: Aluminum, airfoil blades welded to aluminum hub.

F. Accessories:

1. Variable-Speed Controller: Solid-state control to reduce speed from 100 to less than 50 percent.
2. Volume-Control Damper: Manually operated with quadrant lock, located in fan outlet.
3. Companion Flanges: For inlet and outlet duct connections.
4. Fan Guards: 1/2- by 1-inch mesh of galvanized steel in removable frame. Provide guard for inlet or outlet for units not connected to ductwork.
5. Motor and Drive Cover (Belt Guard): Epoxy-coated steel.
6. Vibration Isolators:

a. Type: Spring hangers.
b. Static Deflection: 1 inch.

2.4 MOTORS

A. Motor Sizes: Minimum size as indicated. If not indicated, large enough so driven load will not require motor to operate in service factor range above 1.0.

B. Enclosure Type: Totally enclosed, fan cooled.

2.5 SOURCE QUALITY CONTROL

A. Certify sound-power level ratings according to AMCA 301, "Methods for Calculating Fan Sound Ratings from Laboratory Test Data." Factory test fans according to AMCA 300, "Reverberant Room Method for Sound Testing of Fans." Label fans with the AMCA-Certified Ratings Seal.

B. Certify fan performance ratings, including flow rate, pressure, power, air density, speed of rotation, and efficiency by factory tests according to AMCA 210, "Laboratory Methods of Testing Fans for Aerodynamic Performance Rating." Label fans with the AMCA-Certified Ratings Seal.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Install power ventilators level and plumb.

B. Equipment Mounting:

1. Install power ventilators on cast-in-place concrete equipment base(s). Comply with requirements for equipment bases and foundations specified in other sections.
2. Comply with requirements for vibration isolation and seismic control devices specified in Section 230548 "Vibration and Seismic Controls for HVAC."

C. Secure roof-mounted fans to roof curbs with cadmium-plated hardware. See Section 077200 "Roof Accessories" for installation of roof curbs.

D. Ceiling Units: Suspend units from structure; use steel wire or metal straps.

E. Support suspended units from structure using threaded steel rods and spring hangers having a static deflection of 1 inch. Vibration-control devices are specified in Section 230548 "Vibration and Seismic Controls for HVAC."

F. Install units with clearances for service and maintenance.

G. Label units according to requirements specified in Section 230553 "Identification for HVAC Piping and Equipment."

3.2 CONNECTIONS

A. Drawings indicate general arrangement of ducts and duct accessories. Make final duct connections with flexible connectors. Flexible connectors are specified in Section 233300 "Air Duct Accessories."

B. Install ducts adjacent to power ventilators to allow service and maintenance.

C. Ground equipment according to Section 260526 "Grounding and Bonding for Electrical Systems."

D. Connect wiring according to Section 260519 "Low-Voltage Electrical Power Conductors and Cables."

3.3 FIELD QUALITY CONTROL

A. Perform tests and inspections.

1. Manufacturer's Field Service: Engage a factory-authorized service representative to inspect components, assemblies, and equipment installations, including connections, and to assist in testing.

B. Tests and Inspections:

1. Verify that shipping, blocking, and bracing are removed.
2. Verify that unit is secure on mountings and supporting devices and that connections to ducts and electrical components are complete. Verify that proper thermal-overload protection is installed in motors, starters, and disconnect switches.
3. Verify that cleaning and adjusting are complete.
4. Disconnect fan drive from motor, verify proper motor rotation direction, and verify fan wheel free rotation and smooth bearing operation. Reconnect fan drive system, align and adjust belts, and install belt guards.
5. Adjust belt tension.
6. Adjust damper linkages for proper damper operation.
7. Verify lubrication for bearings and other moving parts.
8. Verify that manual and automatic volume control and fire and smoke dampers in connected ductwork systems are in fully open position.
9. Disable automatic temperature-control operators, energize motor and adjust fan to indicated rpm, and measure and record motor voltage and amperage.
10. Shut unit down and reconnect automatic temperature-control operators.
11. Remove and replace malfunctioning units and retest as specified above.

C. Test and adjust controls and safeties. Replace damaged and malfunctioning controls and equipment.

D. Prepare test and inspection reports.

3.4 ADJUSTING

A. Adjust damper linkages for proper damper operation.

B. Adjust belt tension.

C. Comply with requirements in Section 230593 "Testing, Adjusting, and Balancing for HVAC" for testing, adjusting, and balancing procedures.

D. Replace fan and motor pulleys as required to achieve design airflow.

E. Lubricate bearings.

END OF SECTION 233423

SECTION 23 37 13 - AIR DIFFUSERS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section Includes:

1. Modular core, square ceiling diffusers.
2. Perforated diffusers.

B. Related Sections:

1. Section 233300 "Air Duct Accessories" for fire and smoke dampers and volume-control dampers not integral to diffusers, registers, and grilles.

1.3 ACTION SUBMITTALS

A. Product Data: For each type of product indicated, include the following:

1. Data Sheet: Indicate materials of construction, finish, and mounting details; and performance data including throw and drop, static-pressure drop, and noise ratings.
2. Diffuser, Register, and Grille Schedule: Indicate drawing designation, room location, quantity, model number, size, and accessories furnished.

1.4 INFORMATIONAL SUBMITTALS

A. Coordination Drawings: Reflected ceiling plans, drawn to scale, on which the following items are shown and coordinated with each other, using input from Installers of the items involved:

1. Ceiling suspension assembly members.
2. Method of attaching hangers to building structure.
3. Size and location of initial access modules for acoustical tile.
4. Ceiling-mounted items including lighting fixtures, diffusers, grilles, speakers, sprinklers, access panels, and special moldings.
5. Duct access panels.

B. Source quality-control reports.

PART 2 - PRODUCTS

2.1 CEILING DIFFUSERS

A. Modular Core, Square Ceiling Diffuser:

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

   a. Price Industries.
   b. Titus.
   c. Anemostat Products; a Mestek company.

2. Devices shall be specifically designed for variable-air-volume flows.
3. Material: Steel.
4. Finish: Baked enamel, color selected by Architect.
5. Face Style: Modular Core.
6. Mounting: Surface.
7. Pattern: Adjustable.

B. Perforated Diffuser:

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

   a. Price Industries.
   b. Titus.
   c. Anemostat Products; a Mestek company.

2. Devices shall be specifically designed for variable-air-volume flows.
3. Material: Steel.
4. Finish: Baked enamel, color selected by Architect.
5. Duct Inlet: Square.
6. Face Style: Flush.
7. Mounting: T-bar.
8. Pattern Controller: Adjustable with louvered pattern modules at inlet.

2.2 SOURCE QUALITY CONTROL

A. Verification of Performance: Rate diffusers, registers, and grilles according to ASHRAE 70, "Method of Testing for Rating the Performance of Air Outlets and Inlets."

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine areas where diffusers, registers, and grilles are to be installed for compliance with requirements for installation tolerances and other conditions affecting performance of equipment.

B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION

A. Install diffusers, registers, and grilles level and plumb.

B. Ceiling-Mounted Outlets and Inlets: Drawings indicate general arrangement of ducts, fittings, and accessories. Air outlet and inlet locations have been indicated to achieve design requirements for air volume, noise criteria, airflow pattern, throw, and pressure drop. Make final locations where indicated, as much as practical. For units installed in lay-in ceiling panels, locate units in the center of panel. Where architectural features or other items conflict with installation, notify Architect for a determination of final location.

C. Install diffusers, registers, and grilles with airtight connections to ducts and to allow service and maintenance of dampers, air extractors, and fire dampers.

3.3 ADJUSTING

A. After installation, adjust diffusers, registers, and grilles to air patterns indicated, or as directed, before starting air balancing.

END OF SECTION 233713

SECTION 23 54 00 - FURNACES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. This Section includes the following:

1. Gas-fired furnaces and accessories complete with controls.
2. Air filters.

1.3 ACTION SUBMITTALS

A. Product Data: Include rated capacities, operating characteristics, furnished specialties, and accessories for each of the following:

1. Furnace.
2. Thermostat.
3. Air filter.

B. Shop Drawings: Detail equipment assemblies and indicate dimensions, weights, loads, required clearances, method of field assembly, components, and location and size of each field connection.

1. Wiring Diagrams: Power, signal, and control wiring.

1.4 INFORMATIONAL SUBMITTALS

A. Warranty: Special warranty specified in this Section.

1.5 CLOSEOUT SUBMITTALS

A. Operation and Maintenance Data: For each furnace to include in emergency, operation, and maintenance manuals for each of the following:

1. Furnace and accessories complete with controls.
2. Thermostat
3. Air filter.

1.6 MAINTENANCE MATERIAL SUBMITTALS

A. Furnish extra materials described below that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.

1. Disposable Air Filters: Furnish two complete sets.
2. Fan Belts: Furnish one set(s) for each furnace fan.

1.7 QUALITY ASSURANCE

A. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, Article 100, by a testing agency acceptable to authorities having jurisdiction, and marked for intended use.

B. ASHRAE Compliance: Applicable requirements in ASHRAE 62.1, Section 5 - "Systems and Equipment" and Section 7 - "Construction and Startup."

C. ASHRAE/IESNA 90.1 Compliance: Applicable requirements in ASHRAE/IESNA 90.1, Section 6 - "Heating, Ventilating, and Air-Conditioning."

D. Comply with NFPA 70.

1.8 COORDINATION

A. Coordinate size and location of concrete bases. Cast anchor-bolt inserts into bases. Concrete, reinforcement, and formwork requirements are specified with concrete.

B. Coordinate installation of roof curbs, equipment supports, and roof penetrations. These items are specified in Section 077200 "Roof Accessories."

1.9 WARRANTY

A. Special Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace the following components of furnaces that fail in materials or workmanship within specified warranty period:

1. Warranty Period, Commencing on Date of Substantial Completion:

a. Furnace Heat Exchanger: 10 years

PART 2 - PRODUCTS

2.1 GAS-FIRED FURNACES

A. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:

B. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

C. Basis-of-Design Product: Subject to compliance with requirements, provide the product indicated on Drawings or a comparable product by one of the following:

1. Reznor

D. General Requirements for Gas-Fired, Noncondensing Furnaces: Factory assembled, piped, wired, and tested; complying with ANSI Z21.47/CSA 2.3, "Gas-Fired Central Furnaces," and with NFPA 54.

E. Cabinet: Steel.

1. Cabinet interior around heat exchanger shall be factory-installed insulation.
2. Lift-out panels shall expose burners and all other items requiring access for maintenance.
3. Factory paint external cabinets in manufacturer's standard color.
4. Airstream Surfaces: Surfaces in contact with the airstream shall comply with requirements in ASHRAE 62.1.

F. Fan: Centrifugal, factory balanced, resilient mounted, direct or belt drive.

1. Fan Motors: Comply with requirements in Section 230513 "Common Motor Requirements for HVAC Equipment."
2. Special Motor Features: Single speed, Premium (TM) efficiency, as defined in Section 230513 "Common Motor Requirements for HVAC Equipment," and with internal thermal protection and permanent lubrication.
3. Special Motor Features: Multitapped, multispeed with internal thermal protection and permanent lubrication.
4. Special Motor Features: Electronically controlled motor (ECM) controlled by integrated furnace/blower control.

G. Type of Gas: Natural.

H. Heat Exchanger: Aluminized steel.

I. Burner:

1. Gas Valve: 100 percent safety two-stagemain gas valve, main shutoff valve, pressure regulator, safety pilot with electronic flame sensor, limit control, transformer, and combination ignition/fan timer control board.
2. Ignition: Electric pilot ignition, with hot-surface igniter or electric spark ignition.

J. Gas-Burner Safety Controls:

1. Electronic Flame Sensor: Prevents gas valve from opening until pilot flame is proven; stops gas flow on ignition failure.
2. Flame Rollout Switch: Installed on burner box; prevents burner operation.
3. Limit Control: Fixed stop at maximum permissible setting; de-energizes burner on excessive bonnet temperature; automatic reset.

K. Combustion-Air Inducer: Centrifugal fan with thermally protected motor and sleeve bearings prepurges heat exchanger and vents combustion products; pressure switch prevents furnace operation if combustion-air inlet or flue outlet is blocked.

L. Furnace Controls: Solid-state board integrates ignition, heat, cooling, and fan speeds; and adjustable fan-on and fan-off timing; terminals for connection to accessories.

M. Vent Materials: Comply with requirements in Section 235100 "Breechings, Chimneys, and Stacks" for Type B metal vents.

2.2 THERMOSTATS

A. Controls shall comply with requirements in ASHRAE/IESNA 90.1, "Controls."

B. Solid-State Thermostat: Wall-mounting, programmable, microprocessor-based unit with automatic switching from heating to cooling, preferential rate control, seven-day programmability with minimum of four temperature presets per day, and battery backup protection against power failure for program settings.

C. Single-Stage, Heating-Only Thermostat: Wall-mounting unit with fan on-automatic selector.

D. Control Wiring: Unshielded twisted-pair cabling.

1. No. 24 AWG, 100 ohm, four pair.
2. Cable Jacket Color: Blue.

2.3 AIR FILTERS

A. Washable Filters: 1-inch-thick, urethane pad.

B. Disposable Filters: 1-inch-thick fiberglass media in sheet metal frame.

C. Charged Media Air Filters: Sheet metal housing arranged to be ducted in return-air duct connection to furnace, generates electrostatic charge; MERV 10 rating.

D. HEPA Air Filter Units: Sheet metal housing with fan arranged to be ducted to return-air duct connection to furnace, with activated carbon prefilter, high-efficiency particulate air (HEPA) disposable filter. HEPA shall be as follows:

1. Standard: UL 586, "High-Efficiency, Particulate, Air Filter Units."
2. Rating: ASHRAE 52.1, dust-spot efficiency of 65 percent; ASHRAE 52.2, 99.97 percent efficiency to 0.03-micrometer particle size.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine areas and conditions, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of the Work.

B. Examine factory-installed insulation before furnace installation. Reject units that are wet, moisture damaged, or mold damaged.

C. Examine roughing-in for gas piping systems to verify actual locations of piping connections before equipment installation.

D. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION

A. Install gas-fired furnaces and associated fuel and vent features and systems according to NFPA 54.

B. Install oil-fired furnaces and associated fuel and vent piping according to NFPA 31.

C. Suspended Units: Suspend from structure using threaded rods, spring hangers, and building attachments. Secure rods to unit hanger attachments. Adjust hangers so unit is level and plumb.

1. Install seismic restraints to limit movement of furnace by resisting code-required seismic acceleration.

D. Base-Mounted Units: Secure units to substrate. Provide optional bottom closure base if required by installation conditions.

1. Anchor furnace to substrate to resist code-required seismic acceleration.

E. Controls: Install thermostats and humidistats at mounting height of 60 inches above floor.

F. Wiring Method: Install control wiring in accessible ceiling spaces and in gypsum board partitions where unenclosed wiring method may be used. Conceal control wiring except in unfinished spaces.

G. Install ground-mounted, compressor-condenser components on 4-inch-thick, reinforced concrete base; 4 inches larger on each side than unit. Concrete, reinforcement, and formwork are specified in Section 033000 "Cast-in-Place Concrete." Coordinate anchor installation with concrete base.

H. Install ground-mounted, compressor-condenser components on polyethylene mounting base.

I. Install roof-mounted, compressor-condenser components on equipment supports specified in Section 077200 "Roof Accessories." Anchor units to supports with removable, cadmium-plated fasteners.

3.3 CONNECTIONS

A. Gas piping installation requirements are specified in Section 231123 "Facility Natural-Gas Piping." Drawings indicate general arrangement of piping, fittings, and specialties. Connect gas piping with union or flange and appliance connector valve.

B. Oil piping installation requirements are specified in Section 231113 "Facility Fuel-Oil Piping." Drawings indicate general arrangement of piping, fittings, and specialties. Connect oil piping with union or flange and [ball] [gate] valve.

C. Install piping adjacent to equipment to allow service and maintenance.

D. Water piping installation requirements are specified in Section 221116 "Domestic Water Piping." Drawings indicate general arrangement of piping, fittings, and specialties. Connect water piping with union and ball valve.

E. Vent Connection, Noncondensing, Gas-Fired Furnaces: Connect Type B vents to furnace vent connection and extend outdoors. Type B vents and their installation requirements are specified in Section 235100 "Breechings, Chimneys, and Stacks"

F. Vent and Outside-Air Connection, Condensing, Gas-Fired Furnaces: Connect plastic piping vent material to furnace connections and extend outdoors. Terminate vent outdoors with a cap and in an arrangement that will protect against entry of birds, insects, and dirt.

1. Ream ends of pipes and tubes and remove burrs. Bevel plain ends of steel pipe.
2. Remove scale, slag, dirt, and debris from inside and outside of pipe and fittings before assembly.
3. Plastic Piping Solvent-Cement Joints: Clean and dry joining surfaces. Join pipe and fittings according to the following:

   a. Comply with ASTM F 402 for safe-handling practice of cleaners, primers, and solvent cements.
   b. CPVC Piping: Join according to ASTM D 2846/D 2846M Appendix.
   c. PVC Pressure Piping: Join schedule number ASTM D 1785, PVC pipe and PVC socket fittings according to ASTM D 2672. Join other-than-schedule-number PVC pipe and socket fittings according to ASTM D 2855.
   d. Requirements for Low-Emitting Materials:

      1) CPVC solvent cement shall have a VOC content of 490 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).
      2) PVC solvent cement shall have a VOC content of 510 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).
      3) Adhesive primer shall have a VOC content of 550 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).
      4) Solvent cement and adhesive primer shall comply with the testing and product requirements of the California Department of Health Services' "Standard Practice for the Testing of Volatile Organic Emissions from Various Sources Using Small-Scale Environmental Chambers."

4. Slope pipe vent back to furnace or to outside terminal.

G. Vent Connections, Oil-Fired Furnaces: Connect Type L vents to furnace vent connection and extend outdoors. Type L vents and their installation requirements are specified in Section 235100 "Breechings, Chimneys, and Stacks"

H. Connect ducts to furnace with flexible connector. Comply with requirements in Section 233300 "Air Duct Accessories."

I. Connect refrigerant tubing kits to refrigerant coil in furnace and to air-cooled, compressor-condenser unit.

1. Flared Joints: Use ASME B16.26 fitting and flared ends, following procedures in CDA's "Copper Tube Handbook."
2. Soldered Joints: Apply ASTM B 813, water-flushable flux, unless otherwise indicated, to tube end. Construct joints according to ASTM B 828 or CDA's "Copper Tube Handbook," using lead-free solder alloy complying with ASTM B 32.
3. Brazed Joints: Construct joints according to AWS's "Brazing Handbook," "Pipe and Tube" Chapter, using copper-phosphorus brazing filler metal complying with AWS A5.8.

J. Comply with requirements in Section 232300 "Refrigerant Piping" for installation and joint construction of refrigerant piping.

3.4 FIELD QUALITY CONTROL

A. Perform the following field tests and inspections and prepare test reports:

1. Perform electrical test and visual and mechanical inspection.
2. Leak Test: After installation, charge systems with refrigerant and oil and test for leaks. Repair leaks, replace lost refrigerant and oil, and retest until no leaks exist.
3. Operational Test: After electrical circuitry has been energized, start units to confirm proper operation, product capability, and compliance with requirements.
4. Verify that fan wheel is rotating in the correct direction and is not vibrating or binding.
5. Test and adjust controls and safeties. Replace damaged and malfunctioning controls and equipment.

B. Verify that vibration isolation and flexible connections properly dampen vibration transmission to structure.

3.5 STARTUP SERVICE

A. Complete installation and startup checks according to manufacturer's written instructions and perform the following:

1. Inspect for physical damage to unit casings.
2. Verify that access doors move freely and are weathertight.
3. Clean units and inspect for construction debris.
4. Verify that all bolts and screws are tight.
5. Adjust vibration isolation and flexible connections.
6. Verify that controls are connected and operational.

B. Adjust fan belts to proper alignment and tension.

C. Start unit according to manufacturer's written instructions and complete manufacturer's operational checklist.

D. Measure and record airflows.

E. Verify proper operation of capacity control device.

F. After startup and performance test, lubricate bearings[and adjust belt tension].

3.6 ADJUSTING

A. Adjust initial temperature and humidity set points.

B. Set controls, burner, and other adjustments for optimum heating performance and efficiency. Adjust heat-distribution features, including shutters, dampers, and relays, to provide optimum heating performance and system efficiency.

3.7 CLEANING

A. After completing installation, clean furnaces internally according to manufacturer's written instructions.

B. Install new filters in each furnace within 14 days after Substantial Completion.

3.8 DEMONSTRATION

A. Engage a factory-authorized service representative to train Owner's maintenance personnel to adjust, operate, and maintain condensing units. Refer to Section 017900 "Demonstration and Training."

END OF SECTION 235400

SECTION 23 81 26 - SPLIT-SYSTEM AIR-CONDITIONERS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section includes split-system air-conditioning and heat-pump units consisting of separate evaporator-fan and compressor-condenser components.

1.3 ACTION SUBMITTALS

A. Product Data: For each type of product indicated. Include rated capacities, operating characteristics, and furnished specialties and accessories. Include performance data in terms of capacities, outlet velocities, static pressures, sound power characteristics, motor requirements, and electrical characteristics.

B. Shop Drawings: Include plans, elevations, sections, details, and attachments to other work.

1. Detail equipment assemblies and indicate dimensions, weights, loads, required clearances, method of field assembly, components, and location and size of each field connection.
2. Wiring Diagrams: For power, signal, and control wiring.

1.4 INFORMATIONAL SUBMITTALS

A. Field quality-control reports.

B. Warranty: Sample of special warranty.

1.5 CLOSEOUT SUBMITTALS

A. Operation and Maintenance Data: For split-system air-conditioning units to include in emergency, operation, and maintenance manuals.

1.6 MAINTENANCE MATERIAL SUBMITTALS

A. Furnish extra materials that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.

1. Filters: One set for each air-handling unit.
2. Gaskets: One set for each access door.
3. Fan Belts: One set for each air-handling unit fan.

1.7 QUALITY ASSURANCE

A. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.

B. ASHRAE Compliance:

1. Fabricate and label refrigeration system to comply with ASHRAE 15, "Safety Standard for Refrigeration Systems."
2. ASHRAE Compliance: Applicable requirements in ASHRAE 62.1, Section 4 - "Outdoor Air Quality," Section 5 - "Systems and Equipment," Section 6 - " Procedures," and Section 7 - "Construction and System Start-up."

C. ASHRAE/IESNA Compliance: Applicable requirements in ASHRAE/IESNA 90.1.

1.8 COORDINATION

A. Coordinate sizes and locations of concrete bases with actual equipment provided. Cast anchor-bolt inserts into bases. Concrete, reinforcement, and formwork are specified in Section 033000 "Cast-in-Place Concrete."

B. Coordinate sizes and locations of roof curbs, equipment supports, and roof penetrations with actual equipment provided.

1.9 WARRANTY

A. Special Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace components of split-system air-conditioning units that fail in materials or workmanship within specified warranty period.

1. Warranty Period:

a. For Compressor: Five year(s) from date of Substantial Completion.
b. For Parts: One year from date of Substantial Completion.
c. For Labor: One year from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1. LG

2.2 INDOOR UNITS (5 TONS OR LESS)

A. Wall-Mounted, Evaporator-Fan Components:

1. Cabinet: Enameled steel with removable panels on front and ends in color selected by Architect, and discharge drain pans with drain connection.
2. Refrigerant Coil: Copper tube, with mechanically bonded aluminum fins and thermal-expansion valve. Comply with ARI 206/110.
3. Fan: Direct drive, centrifugal.
4. Fan Motors:

    a. Multitapped, multispeed with internal thermal protection and permanent lubrication.
    b. Enclosure Type: Totally enclosed, fan cooled.
    c. NEMA Premium (TM) efficient motors as defined in NEMA MG 1.
    d. Controllers, Electrical Devices, and Wiring: Comply with requirements for electrical devices and connections specified in electrical Sections.
    e. Mount unit-mounted disconnect switches on exterior of unit.

5. Airstream Surfaces: Surfaces in contact with the airstream shall comply with requirements in ASHRAE 62.1.
6. Filters: Permanent, cleanable.
7. Condensate Drain Pans:

    a. Fabricated with **one** percent slope in at least two planes to collect condensate from cooling coils (including coil piping connections, coil headers, and return bends) and humidifiers, and to direct water toward drain connection.

        1) Length: Extend drain pan downstream from leaving face to comply with ASHRAE 62.1.
        2) Depth: A minimum of 1 inch deep.

    b. Single-wall, galvanized-steel sheet.
    c. Drain Connection: Located at lowest point of pan and sized to prevent overflow. Terminate with threaded nipple on one end of pan.

        1) Minimum Connection Size: NPS 1.

    d. Pan-Top Surface Coating: Asphaltic waterproofing compound.

2.3 OUTDOOR UNITS (5 TONS OR LESS)

A. Air-Cooled, Compressor-Condenser Components:

1. Casing: Steel, finished with baked enamel in color selected by Architect, with removable panels for access to controls, weep holes for water drainage, and mounting holes in base. Provide brass service valves, fittings, and gage ports on exterior of casing.
2. Compressor: Hermetically sealed with crankcase heater and mounted on vibration isolation device. Compressor motor shall have thermal- and current-sensitive overload devices, start capacitor, relay, and contactor.

    a. Compressor Type: Scroll.
    b. Two-speed compressor motor with manual-reset high-pressure switch and automatic-reset low-pressure switch.
    c. Refrigerant Charge: R-454b or R-32
    d. Refrigerant Coil: Copper tube, with mechanically bonded aluminum fins and liquid subcooler. Comply with ARI 206/110.

3. Heat-Pump Components: Reversing valve and low-temperature-air cutoff thermostat.

4. Fan: Aluminum-propeller type, directly connected to motor.
5. Motor: Permanently lubricated, with integral thermal-overload protection.
6. Low Ambient Kit: Permits operation down to 45 deg F.
7. Mounting Base: Polyethylene.

2.4 ACCESSORIES

A. Thermostat: Wireless infrared functioning to remotely control compressor and evaporator fan, with the following features:

1. Compressor time delay.
2. 24-hour time control of system stop and start.
3. Liquid-crystal display indicating temperature, set-point temperature, time setting, operating mode, and fan speed.
4. Fan-speed selection including auto setting.

B. Automatic-reset timer to prevent rapid cycling of compressor.

C. Refrigerant Line Kits: Soft-annealed copper suction and liquid lines factory cleaned, dried, pressurized, and sealed; factory-insulated suction line with flared fittings at both ends.

D. Drain Hose: For condensate.

E. Additional Monitoring:

1. Monitor constant and variable motor loads.
2. Monitor variable-frequency-drive operation.
3. Monitor cooling load.
4. Monitor air distribution static pressure and ventilation air volumes.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Install units level and plumb.

B. Install evaporator-fan components using manufacturer's standard mounting devices securely fastened to building structure.

C. Equipment Mounting:

1. Install ground-mounted, compressor-condenser components on cast-in-place concrete equipment base(s). Comply with requirements for equipment bases and foundations specified in other sections.
2. Install ground-mounted, compressor-condenser components on polyethylene mounting base.

D. Install and connect precharged refrigerant tubing to component's quick-connect fittings. Install tubing to allow access to unit.

3.2 CONNECTIONS

A. Piping installation requirements are specified in other Sections. Drawings indicate general arrangement of piping, fittings, and specialties.

B. Where piping is installed adjacent to unit, allow space for service and maintenance of unit.

3.3 FIELD QUALITY CONTROL

A. Manufacturer's Field Service: Engage a factory-authorized service representative to inspect, test, and adjust components, assemblies, and equipment installations, including connections.

B. Perform tests and inspections.

1. Manufacturer's Field Service: Engage a factory-authorized service representative to inspect components, assemblies, and equipment installations, including connections, and to assist in testing.

C. Tests and Inspections:

1. Leak Test: After installation, charge system and test for leaks. Repair leaks and retest until no leaks exist.
2. Operational Test: After electrical circuitry has been energized, start units to confirm proper motor rotation and unit operation.
3. Test and adjust controls and safeties. Replace damaged and malfunctioning controls and equipment.

D. Remove and replace malfunctioning units and retest as specified above.

E. Prepare test and inspection reports.

3.4 STARTUP SERVICE

A. Engage a factory-authorized service representative to perform startup service.

1. Complete installation and startup checks according to manufacturer's written instructions.

3.5 DEMONSTRATION

A. Engage a factory-authorized service representative to train Owner's maintenance personnel to adjust, operate, and maintain units.

END OF SECTION 238126

SECTION 23 81 29 - VARIABLE REFRIGERANT FLOW HVAC SYSTEMS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section includes multi evaporator, direct expansion, air-cooled, variable capacity, split systems.

1.3 ACTION SUBMITTALS

A. Product Data: For each type of product indicated. Include rated capacities, operating characteristics, and furnished specialties and accessories. Include performance data in terms of capacities, outlet velocities, static pressures, sound power characteristics, motor requirements, and electrical characteristics.

B. Shop Drawings: Include plans, elevations, sections, details, and attachments to other work.

1. Detail equipment assemblies and indicate dimensions, weights, loads, required clearances, method of field assembly, components, and location and size of each field connection.
2. Wiring Diagrams: For power, signal, and control wiring.

1.4 INFORMATIONAL SUBMITTALS

A. Field quality-control reports.

B. Warranty: Sample of special warranty.

1.5 CLOSEOUT SUBMITTALS

A. Operation and Maintenance Data: For split-system air-conditioning units to include in emergency, operation, and maintenance manuals.

1.6 MAINTENANCE MATERIAL SUBMITTALS

A. Furnish extra materials that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.

1. Filters: One set(s) for each air-handling unit.

1.7 QUALITY ASSURANCE

A. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.

B. ASHRAE Compliance:

1. Fabricate and label refrigeration system to comply with ASHRAE 15, "Safety Standard for Refrigeration Systems."
2. ASHRAE Compliance: Applicable requirements in ASHRAE 62.1, Section 4 - "Outdoor Air Quality," Section 5 - "Systems and Equipment," Section 6 - " Procedures," and Section 7 - "Construction and System Start-up."

C. ASHRAE/IESNA Compliance: Applicable requirements in ASHRAE/IESNA 90.1.

1.8 COORDINATION

A. Coordinate sizes and locations of concrete bases with actual equipment provided. Cast anchor-bolt inserts into bases. Concrete, reinforcement, and formwork are specified in Section 033000 "Cast-in-Place Concrete."

B. Coordinate sizes and locations of roof curbs, equipment supports, and roof penetrations with actual equipment provided.

1.9 WARRANTY

A. Special Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace components of split-system air-conditioning units that fail in materials or workmanship within specified warranty period.

1. Warranty Period:

a. For Compressor: 10 year(s) from date of Substantial Completion.
b. For Parts: 10 year(s) from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
1. LG
2. (or equal)

2.2 CONDENSING UNIT

A. General: The condensing unit is designed specifically for use with VRV IV series components.
1. The condensing unit shall be factory assembled in the USA and pre-wired with all necessary electronic and refrigerant controls. The refrigeration circuit of the condensing unit shall consist of LG inverter scroll compressors, motors, fans, con-

denser coil, electronic expansion valves, solenoid valves, 4-way valve, distribution headers, capillaries, filters, shut off valves, oil separators, service ports, liquid receiver and suction accumulator.
High/low pressure gas line, liquid and suction lines must be individually insulated between the condensing and indoor units.

2. The condensing unit can be wired and piped with access from the left, right, rear or bottom.
3. The connection ratio of indoor units to condensing unit shall be permitted up to 200%.
4. Each condensing system shall be able to support the connection of up to 64 indoor units dependent on the model of the condensing unit.
5. The sound pressure level standard shall be that value as listed in the LG engineering manual for the specified models at 3 feet from the front of the unit. The condensing unit shall be capable of operating automatically at further reduced noise during night time or via an external input.
6. The system will automatically restart operation after a power failure and will not cause any settings to be lost, thus eliminating the need for reprogramming.
7. The unit shall incorporate an auto-charging feature. Manual changing should be support with a minimum of 2 hours of system operation data to ensure correct operation.
8. The condensing unit shall be modular in design and should allow for side-by-side installation with minimum spacing.
9. The following safety devices shall be included on the condensing unit; high pressure sensor and switch, low pressure sensor, control circuit fuses, crankcase heaters, fusible plug, overload relay, inverter overload protector, thermal protectors for compressor and fan motors, over current protection for the inverter and anti-recycling timers.
10. To ensure the liquid refrigerant does not flash when supplying to the various indoor units, the circuit shall be provided with a sub-cooling feature.
11. Oil recovery cycle shall be automatic occurring 2 hours after start of operation and then every 8 hours of operation. Each system shall maintain continuous heating during oil return operation.
12. The condensing unit shall be capable of heating operation at -13°F wet bulb ambient temperature without additional low ambient controls or an auxiliary heat source.
13. The multiple condenser VRV systems shall continue to provide heat to the indoor units in heating operation while in the defrost mode.

B. Unit Cabinet:
1. The condensing unit shall be completely weatherproof and corrosion resistant. The unit shall be constructed from rust-proofed mild steel panels coated with a baked enamel finish.

C. Fan:
1. The condensing unit shall consist of one or more propeller type, direct-drive 350 or 750 W fan motors that have multiple speed operation via a DC (digitally commutating) inverter.
2. The condensing unit fan motor shall have multiple speed operation of the DC (digitally commutating) inverter type, and be of high external static pressure and shall be factory set as standard at 0.12 in. WG. A field setting switch to a maximum 0.32 in. WG pressure is available to accommodate field applied duct for indoor mounting of condensing units.
3. The fan shall be a vertical discharge configuration with a nominal airflow maximum range of 5,544 CFM to 24,684 CFM dependent on model specified.
4. Nominal sound pressure levels shall be as shown below.
5. The fan motor shall have inherent protection and permanently lubricated bearings and be mounted.

6. The fan motor shall be provided with a fan guard to prevent contact with moving parts.
7. Night setback control of the fan motor for low noise operation by way of automatically limiting the maximum speed shall be a standard feature. Operation sound level shall be selectable from 3 steps as shown below.

Operation Sound dB(A)	**Night Mode Sound Pressure Level dB(A)**
Step 1 max.	55
Step 2 max.	50
Step 3 max.	45

D. Condenser Coil:
1. The condenser coil shall be manufactured from copper tubes expanded into aluminum fins to form a mechanical bond.
2. The heat exchanger coil shall be of a waffle louver fin and rifled bore tube design to ensure high efficiency performance.
3. The heat exchanger on the condensing units shall be manufactured from Hi-X seamless copper tube with N-shape internal grooves mechanically bonded on to aluminum fins to an e-Pass Design.
4. The fins are to be covered with an anti-corrosion Ulta Gold coating as standard with a salt spray test rating of 1000hr (ASTM B117 & Blister Rating:10), Acetic acid salt spray test: 500hr (ASTM G85 & Blister Rating:10)
5. The pipe plates shall be treated with powdered polyester resin for corrosion prevention. The thickness of the coating must be between 2.0 to 3.0 microns.
6. The outdoor coil shall have three-circuit heat exchanger design eliminating the need for bottom plate heater. The lower part of the coil shall be used for inverter cooling and be on or off during heating operation enhancing the defrost operation.

E. Compressor:
1. The LG inverter scroll compressors shall be variable speed (inverter) controlled which is capable of changing the speed to follow the variations in total cooling and heating load as determined by the suction gas pressure as measured in the condensing unit. In addition, samplings of evaporator and condenser temperatures shall be made so that the high/low pressures detected are read every 20 seconds and calculated. With each reading, the compressor capacity (INV frequency) shall be controlled to eliminate deviation from target value. Non inverter-driven compressors, which may cause starting motor current to exceed the nominal motor current (RLA) and require larger wire sizing, shall not be allowed.
2. The inverter driven compressor in each condensing unit shall be of highly efficient reluctance DC (digitally commutating), hermetically sealed scroll “G-type” or “J-type”.
3. Neodymium magnets shall be adopted in the rotor construction to yield a higher torque and efficiency in the compressor instead of the normal ferrite magnet type. At complete stop of the compressor, the neodymium magnets will position the rotor into the optimum position for a low torque start.
4. The capacity control range shall be as low as 3% to 100%.
5. The compressors’ motors shall have a cooling system using discharge gas, to avoid sudden changes in temperature resulting in significant stresses on winding and bearings.
6. Each compressor shall be equipped with a crankcase heater, high pressure safety switch, and internal thermal overload protector.
7. Oil separators shall be standard with the equipment together with an intelligent oil management system.
8. The compressor shall be spring mounted to avoid the transmission of vibration eliminating the standard need for spring insolation.

9. In the event of compressor failure the remaining compressors shall continue to operate and provide heating or cooling as required at a proportionally reduced capacity. The microprocessor and associated controls shall be designed to specifically address this condition.
10. In the case of multiple condenser modules, conjoined operation hours of the compressors shall be balanced by means of the Duty Cycling Function, ensuring sequential starting of each module at each start/stop cycle, completion of oil return, completion of defrost or every 8 hours and extending the operating life of the system. When connected to a central control system, sequential start is activated for all system on each DIII network.

F. Electrical:
1. The power supply to the condensing unit shall be 208 volts, 1 phase, 60 hertz +/- 10%.
2. The control voltage between the indoor and condensing unit shall be 16VDC non-shielded, stranded 2 conductor cable.
3. The control wiring shall be a two-wire multiplex transmission system, making it possible to connect multiple indoor units to one condensing unit with one 2-cable wire, thus simplifying the wiring installation.

4.02 BRANCH SELECTOR BOX FOR HEAT RECOVERY SYSTEM

A. General: Branch selector boxes are designed specifically for use with series heat recovery system components.
1. These selector boxes shall be factory assembled, wired, and piped.
2. These branch controllers must be run tested at the factory.
3. These selector boxes must be mounted indoors.
4. When simultaneously heating and cooling, the units in heating mode shall energize their subcooling electronic expansion valve.

B. Unit Cabinet:
1. These units shall have a galvanized steel plate casing.
2. Each cabinet shall house 3 electronic expansion valves for refrigerant control per branch.
3. The cabinet shall contain one subcooling heat exchanger per branch.
4. The unit shall have sound absorption thermal insulation material made of flame and heat resistant foamed polyethylene.

C. Refrigerant Valves:
1. The unit shall be furnished with 3 electronic expansion valves per branch to control the direction of refrigerant flow. The use of solenoid valves for changeover and pressure equalization shall not be acceptable due to refrigerant noise.
2. The refrigerant connections must be of the braze type.
3. In multi-port units, each port shall have its own electronic expansion valves. If common expansion/solenoid valves are used, redundancy must be provided.
4. Each circuit shall have at least one branch selector box.
5. Multiple indoor units may be connected to a branch selector box with the use of a REFNET™ joint provided they are within the capacity range of the branch selector.

D. Condensate Removal:
1. The unit shall not require provisions for condensate removal. A safety device or secondary drain pan shall be installed by the mechanical contractor to comply with the applicable mechanical code if an alternate manufacturer is selected.

E. Electrical:
1. The unit electrical power shall be 208/230 volts, 1 phase, 60 hertz.
2. The unit shall be capable of operation within the limits of 187 volts to 255 volts.
3. The minimum circuit amps (MCA) shall be 0.1 and the maximum overcurrent protection amps (MOP) shall be 15.

4. The control voltage between the indoor and condensing unit shall be 16VDC non-shielded 2 conductor cable.

2.3 VRV INDOOR UNITS

A. General: LG indoor unit shall be a built-in ceiling concealed fan coil unit, operable with refrigerant R-454b or R-32, equipped with an electronic expansion valve, direct-drive DC (ECM) type fan with auto CFM adjustment at commissioning, for installation into the ceiling cavity. It is constructed of a galvanized steel casing. It shall be available in capacities from 7,500 Btu/h to 48,000 Btu/h. It shall be a horizontal discharge air with horizontal return air configuration. All models feature a low height cabinet making them applicable to ceiling pockets that tend to be shallow. Computerized PID control shall be used to control superheat to deliver a comfortable room temperature condition. The unit shall be equipped with a programmed drying mechanism that dehumidifies while limiting changes in room temperature when used with LG remote control. Included as standard equipment, a condensate drain pan and drain pump kit that pumps to 18-3/8” from the drain pipe opening. The indoor units sound pressure shall range from 29 dB(A) to 43 dB(A) at low speed measured 5 feet below the ducted unit.

B. Indoor Unit:
   1. The LG indoor unit shall be completely factory assembled and tested. Included in the unit is factory wiring, piping, electronic proportional expansion valve, control circuit board, fan motor thermal protector, flare connections, condensate drain pan, condensate drain pump, condensate safety shutoff and alarm, self-diagnostics, auto-restart function, 3-minute fused time delay, and test run switch. The unit shall be equipment with automatically adjusting external static pressure logic that is selectable during commissioning. This adjusts the airflow based on the installed external static pressure.
   2. Indoor unit and refrigerant pipes will be charged with dehydrated air prior to shipment from the factory.
   3. Both refrigerant lines shall be insulated from the outdoor unit.
   4. The indoor units shall be equipped with a condensate pan and condensate pump. The condensate pump provides up to 18-3/8” of lift from the center of the drain outlet and has a built in safety shutoff and alarm.
   5. The indoor units shall be equipped with a return air thermistor.
   6. The indoor unit will be separately powered with 208~230V/1-phase/60Hz.
   7. The voltage range will be 253 volts maximum and 187 volts minimum.

D. Unit Cabinet:
   1. The cabinet shall be located into the ceiling and ducted to the supply and return openings.
   2. The cabinet shall be constructed with sound absorbing foamed polystyrene and polyethylene insulation.

E. Fan:
   1. The fan shall be direct-drive DC (ECM) type fan, statically and dynamically balanced impeller with three fan speeds available.
   2. The unit shall be equipment with automatically adjusting external static pressure logic selectable during commissioning.
   3. The fan motor shall operate on 208/230 volts, 1 phase, 60 hertz with a motor output range of 0.12 to 0.47 HP respectively.
   4. The airflow rate shall be available in three settings.
   5. The fan motor shall be thermally protected.
   6. The fan motor shall be equipped as standard with adjustable external static pressure (ESP) settings.

F. Coil:
   1. Coils shall be of the direct expansion type constructed from copper tubes expanded into aluminum fins to form a mechanical bond.

2. The coil shall be of a waffle louver fin and high heat exchange, rifled bore tube design to ensure highly efficient performance.
3. The coil shall be a 3 row cross fin copper evaporator coil with 13 fpi design completely factory tested.
4. The refrigerant connections shall be flare connections and the condensate will be 1-1/4” outside diameter PVC.
5. A condensate pan shall be located under the coil.
6. A condensate pump with an 18-3/8” lift shall be located below the coil in the condensate pan with a built in safety alarm.
7. A thermistor will be located on the liquid and gas line.

G. Electrical:
1. A separate power supply will be required of 208/230 volts, 1 phase, 60 hertz. The acceptable voltage range shall be 187 to 253 volts.
2. Transmission (control) wiring between the indoor and outdoor unit shall be a maximum of 3,280 feet (total 6,560 feet).
3. Transmission (control) wiring between the indoor unit and remote controller shall be a maximum distance of 1,640 feet.

H. Control:
1. The unit shall have controls provided by LG to perform input functions necessary to operate the system.
2. The unit shall be compatible with interfacing with a BMS system via optional LonWorks or BACnet gateways.
3. The unit shall be compatible with a LG Intelligent Touch Manager advanced multi-zone controller.

I. Optional Accessories Available:
1. MERV 13 Filter kit. Can be configured for right or left access. Filters replaceable without tools.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Install units level and plumb.

B. Install evaporator-fan components using manufacturer's standard mounting devices securely fastened to building structure.

C. Equipment Mounting:

1. Install ground-mounted, compressor-condenser components on cast-in-place concrete equipment base(s).
2. Comply with requirements for vibration isolation and seismic control devices specified in Section 230548 "Vibration and Seismic Controls for HVAC."

3.2 CONNECTIONS

A. Piping installation requirements are specified in other Sections. Drawings indicate general arrangement of piping, fittings, and specialties.

B. Where piping is installed adjacent to unit, allow space for service and maintenance of unit.

C. Duct Connections: Duct installation requirements are specified in Section 233113 "Metal Ducts." Drawings indicate the general arrangement of ducts. Connect supply **and return** ducts to split-system air-conditioning units with flexible duct connectors. Flexible duct connectors are specified in Section 233300 "Air Duct Accessories."

3.3 FIELD QUALITY CONTROL

A. Manufacturer's Field Service: Engage a factory-authorized service representative to inspect, test, and adjust components, assemblies, and equipment installations, including connections.

B. Perform tests and inspections.

1. Manufacturer's Field Service: Engage a factory-authorized service representative to inspect components, assemblies, and equipment installations, including connections, and to assist in testing.

C. Tests and Inspections:

1. Leak Test: After installation, charge system and test for leaks. Repair leaks and retest until no leaks exist.
2. Operational Test: After electrical circuitry has been energized, start units to confirm proper motor rotation and unit operation.
3. Test and adjust controls and safeties. Replace damaged and malfunctioning controls and equipment.

D. Remove and replace malfunctioning units and retest as specified above.

E. Prepare test and inspection reports.

3.4 STARTUP SERVICE

A. Engage a factory-authorized service representative to perform startup service.

1. Complete installation and startup checks according to manufacturer's written instructions.

3.5 DEMONSTRATION

A. Engage a factory-authorized service representative to train Owner's maintenance personnel to adjust, operate, and maintain units.

END OF SECTION 238129

SECTION 26 00 00 GENERAL ELECTRICAL REQUIREMENTS

PART 1 - GENERAL

1.1 SCOPE

A. Work of this section includes everything necessary for or incidental to completing the electrical work, to provide a complete and operable electrical system, except as herein specifically excluded.

1.2 GENERAL REQUIREMENTS

A. Electrical System Characteristics: 120/208V. 3PH, 4W.

B. Guarantee: Furnish a written guarantee for a period of one-year from date of acceptance.

C. Codes and Regulations: Work done under this Section shall comply with the latest edition of the following: California Electrical Code, State of California Title 24, State Building Standards, Occupational Safety and Health Administration (OSHA) requirements, State of California Title 17 and to all local codes having jurisdiction. In the case where the codes have different levels of requirements, the most stringent rule shall apply.

D. Wherever a discrepancy in quantity or size of conduit, wire, equipment, devices, circuit breakers, etc., (all materials), arises on the Drawing and/or Specifications, the Contractor shall be responsible for providing and installing all material and services required by the strictest condition noted on Drawings and/or in Specifications to insure complete and operable systems as required by the Owner and Engineer.

E. The General and Supplementary Conditions, as well as Special Conditions apply in addition to items in the Electrical Section. Special attention is directed to the following sections:

1. Drawings and Specifications at the site.
2. Shop drawings and samples.
3. Record drawings.
4. Cutting and Patching.
5. Cleaning up.
6. Guarantee.
7. Tests.

F. Additional Work: Refer to Mechanical, Plumbing and Alerting System Contractor drawings and specifications for additional Electrical requirements.

G. Testing:

1. Scan:
   a. Infrascan test of the power distribution branch circuit panels shall be required.
   b. Infrascan certified reports shall be submitted on completion to the Owner and Engineer.
   c. Scans shall be performed by an independent testing laboratory with total connected loads in operation.

2. Megger:
   a. New branch circuit - phase, neutral and ground conductors.
   b. New insulated bonding conductors.

3. All circuits shall be tested for continuity and circuit integrity. Adjustments shall be made for circuits not complying with testing criteria.

4. Grounding System: Shall be tested by an independent testing laboratory to meet resistance specified in Part 3.1, D.3 of these Specifications. It shall be this Contractor's responsibility to make adjustments, as required, to upgrade non-complying systems to proper and safe operation.

5. All certified testing reports shall be submitted to the Owner at completion of project.

H. All Core Cutting, Drilling, and Patching:

1. For the installation of work under this Section, the aforementioned shall be performed under this Section of the Specifications and the Concrete section of the Specifications.

2. No holes will be allowed in any structural members without the written approval of the Structural Engineer.

3. For penetrations of concrete slabs or concrete footings, the work will be as directed in the Concrete Section of Specifications.

4. The contractor shall be responsible for patching and repairing surfaces where he is required to penetrate for work under this contract.

5. Penetrations shall be sealed to meet the rated integrity of the surface required to be patched and repaired. The patched surface shall be painted or finished to match the existing surface.

I. Verifying Drawings and Job Conditions:

1. This Contractor shall examine all Drawings and Specifications in a manner to be fully cognizant of all work required under this Section.

2. This Contractor shall visit the site and verify existing conditions. Where existing conditions differ from Drawings, adjustment shall be made and allowances included for all necessary equipment to complete all parts of the Drawings and Specifications.

J. Shop Drawings/Product Submittals:

1. Drawings shall be submitted in six (6) bound sets accompanied by Letter of Transmittal, which shall give a list of the number and dates of the drawings submitted. Drawings shall be complete in every respect and bound in sets.

2. The Drawings submitted shall be marked with the name of the project, numbered consecutively and bear the approval of the Contractor as evidence that the Drawings have been checked by the Contractor. Any Drawings submitted without this approval will be returned to the Contractor for resubmission.

3. If the shop drawings show variations from the requirements of the Contract because of standard shop practice or other reasons, the Contractor shall make specific mention of such variations in his letter of transmittal. If the substitution is accepted, the Contractor shall be responsible for proper adjustment which may be caused by the substitution. Complete working samples shall be submitted with all requests for substitution.

4. Shop drawings/product data shall be submitted on the following but not limited to:

    a. Lighting fixtures and drivers.

    b. Fire alarm system.

    c. Switches/Occupant sensors/Disconnect switches.

    d. Automatic Lighting control system.

    e. Receptacles.

    f. Low Voltage / Communication system.

    g. Low Voltage / Signal and alarm systems.

    h. Audio Visual system.

    i. Fuses.

    j. Pull boxes.

    k. Emergency generator and transfer switch.

    l. Terminal Cabinets.

    m. Conduit and fittings.

    n. Wire/Conductors/Cables.

    o. Conduit/Cable Tray supports.

    p. Cable Tray and fittings.

    q. Outlet boxes/Flush floor boxes.

5. Shop drawings shall include scaled site plans and floor plans indicating the location of all equipment, devices, interconnecting wire/cable, wiring diagrams, rack/enclosure elevations indicating the location of all rack mounted equipment, and sequence of operation.

6. Shop drawings shall include copies of the contractor's current C-10 license. For low voltage systems the submittal shall include copies of the contractor's current C-7 license, and copies of certificates identifying the low voltage contractor as a licensed distributor/installer of the equipment included in the submittal.

7. Refer to Division 27 and 28 for additional requirements.

K. Drawings of Record: The Contractor shall provide and keep up-to-date, a complete record set of blueprints. These shall be corrected daily and show every change from the original Drawings. This set of prints shall be kept on the job site and shall be used only as a record set. This shall not be construed as authorization for the Contractor to make changes in the layout without definite instruction in each case. Upon completion of the work, a set of reproducible Contract Drawings shall be obtained from the General Contractor and all changes as noted on the record set of prints shall be incorporated thereon with black ink in a neat, legible, understandable and professional manner. Refer to the Supplementary General Conditions for complete requirements.

1.3 WORK IN COOPERATION WITH OTHER TRADES

A. Examine the Drawings and Specifications and determine the work to be performed by the site utilities contractor, mechanical and plumbing contractor, solar PV contractor, Alerting system contractor, and other trades. Provide the type and amount of electrical materials and equipment necessary to place this work in proper operation, completely wired, tested and ready for use. This shall include all conduit, wire, disconnects, relays, and other devices for the required operation of all systems or equipment whether shown on plan or not.

B. Provide power and control circuits, conduit and wire as indicated on the Mechanical, Plumbing, solar PV, and Alerting system drawings as required for complete and operable systems.

C. The electrical contractor shall be responsible for providing and installing specialty back-boxes for all communication/signal systems. The electrical contractor shall patch, repair and refinish walls, ceilings or floors disturbed by the installation of the subject back boxes.

1.4 TESTING AND ADJUSTMENT

A. Upon completion of all electrical work, this Contractor shall test all circuits, switches, motors, breakers, motor starter(s) and their auxiliary circuits and any other electrical items to insure perfect operation of all electrical equipment.

B. Equipment and parts in need of correction and discovered during such testing shall be immediately repaired or replaced with all new equipment and that part of the system shall then be retested. All such replacement or repair shall be done at no additional cost to the Owner.

C. All circuit shall be tested for continuity and circuit integrity. Adjustments shall be made for circuits not complying with testing criteria.

D. All certified testing reports shall be submitted to the Engineer at completion of project.

1.5 IDENTIFICATION

A. Identification nameplates shall be Micarta 1/8" thick and of approved size, with bevelled edges and engraved white letters 1/4" high minimum on black background. Nameplates shall be provided for all circuits in the distribution switchboards, and selector switches. Inscriptions on equipment shall be identical to those indicated in panels and/or motor control centers and other similar devices. Each nameplate shall be provided with drillings and suitable mounting screws corresponding to finish of the nameplate. The inscriptions in each nameplate shall be as indicated on the Drawings.

B. Identification of Air Conditioning Equipment: Equipment to be so identified shall include, but shall not be limited to: Pressure and temperature controllers; switches; equipment motors and boxes or cans housing other control items. Mechanical equipment nameplates shall have letters a minimum of 3/8" high.

C. Identification of Signal/Communication Outlet Wall Plates: Outlet wall plates shall be engraved on the backside with its related signal/communication system and its serving conduit origin point.

D. Refer to Section 260573 for short circuit and arc flash labeling requirements.

1.6 MAINTENANCE, SERVICING, INSTRUCTION MANUALS AND WIRING DIAGRAMS

A. Prior to final acceptance of the job, the Electrical Contractor shall furnish to the Owner at least four (4) copies of operating and maintenance and servicing instructions, as well as four (4) complete wiring diagrams for the following item(s) or equipment:

1. Communications system.
2. Signal/alarm system.
3. Audio-Video (A/V) system.
4. Fire alarm system.
5. Panelboards.
6. Switchboards.
7. Circuit breakers.
8. Disconnect switches.
9. Emergency generator and transfer switch.
10. LED drivers.
11. Lighting controls.
12. Occupant sensors, power packs, relay packs.

B. All wiring diagrams shall specifically cover the system supplied. Typical drawings will not be accepted. Two (2) copies shall be presented to the Electrical Engineer and four (4) copies to the Owner.

1.7 ELECTRICAL CONTRACTOR'S RESPONSIBILITY

A. It shall be the Electrical Contractor's responsibility to obtain a complete set of Drawings and Specifications. He shall check the Drawings of the other trades and shall carefully read the entire Specifications and determine his responsibilities.

B. Contractor shall carry a valid State of California contractor’s license.

1.8 FINAL INSPECTION AND ACCEPTANCE

A. After all requirements of the Specifications and/or the Drawings have been fully completed, representatives of the Owner will inspect the work. Contractor shall provide competent personnel to demonstrate the operation of any item or system to the full satisfaction of each representative.

B. Final acceptance of the work will be made by the Owner after receipt of approval and recommendation of acceptance from each representative.

1.9 RECORD DRAWINGS

A. Contractor shall furnish one set of reproducible record drawings before final payment of retention.

1.10 SUBSTITUTIONS

A. Substitution to specified equipment shall be submitted and received by the Engineer fifteen (15) days after the bid date for review and approval.

B. To receive consideration, requests for substitutions must be accompanied by documentary proof of its equality with the specified material. Documentary proof shall be in letter form and identify the specified values/materials alongside proposed equal values/materials. In addition, catalog brochures and samples must be included in the submittal.

C. In the event that authorization is given for a substitute equal to bid, after award of contract the Contractor shall submit to the Engineer certified quotations from suppliers of both the specified and proposed equal material for price comparison and delivery dates.

D. In the event of cost reduction, the Owner will be credited with 100 percent of the reduction, arranged by Change Order.

E. The Contractor warrants that substitutions proposed for specified items will fully perform the functions required.

F. Substitutions or requests for substitution shall not be accepted and rejected for failure to comply with items A-E above.

PART 2 - PRODUCTS

2.1 MATERIALS

A. Materials and Equipment: All electrical materials and equipment shall be new and shall be listed by Underwriter's Laboratories and bear their label, or listed and certified by a nationally recognized testing authority where UL does not have an approval. Custom made equipment must have complete test data submitted by the manufacturer attesting to its safety. In addition, the materials and equipment shall comply with the requirements of the following:

1. American Society of Testing Materials (ASTM).

2. Insulated Cable Engineers Association (ICEA).

3. National Electrical Manufacturer's Association (NEMA).

4. National Fire Protection Association (NFPA).

5. American National Standard Institute (ANSI).

B. Lighting Fixtures:

1. Furnish, install and connect a lighting fixture at each outlet where a lighting fixture type symbol (designated on plans) is shown as being installed. Each fixture shall be complete with all required accessories including sockets, glassware, boxes, spacers, mounting devices, fire rating enclosure, chips and drivers.

2. LED Driver shall be Class 1, 120-277V, 50/60HZ (constant current) with surge protection in accordance with IEEE/ANSI C62.41.2 guidelines with a surge current rating of 10,000 amps. Operating temperature for interior fixtures shall range from 0°C to 35°C (32°F to 95°F). Operating temperature for exterior fixtures shall range from -40°C to 40°C (-40°F to 104°F). All defective drivers shall be replaced at no cost to the Owner.

3. LED chips shall be as manufactured by CREE, Philips-Lumileds, Nichia, Osram or approved equal.

4. Interior fixtures installed in individual rooms shall be provided with LED chips of the same manufacturer. Mixing of chip manufacturers will not be allowed. All fixtures in any one room must be replaced with new fixtures when the fixtures in the room display dissimilar illumination colors.

5. Exterior fixtures shall be provided with LED chips of the same manufacturer. Mixing of chip manufacturers will not be allowed. All fixtures within line of sight must be replaced with new fixtures when the fixtures in the line of sight display dissimilar illumination colors.

6. LED chips shall have 4000º Kelvin color temperature. Interior fixtures shall meet IESNA LM-79-08. Exterior fixtures shall meet IESNA LM-80-08.

7. Where indicated on the Lighting Fixture Schedule, interior light fixtures shall be provided with integral occupancy sensor and/or daylight sensor. Provide two (2) programming/configuration tools for programming the integral control devices.

8. Refer to Architectural reflected ceiling plan for type of ceiling being installed in each room and provide each fixture with required mounting devices and accessories for the particular ceiling.

9. All light fixtures shall be individually supported and properly anchored to the surfaces indicated on the Architectural elevations.

10. Locations of fixtures shall be per the architectural reflected ceiling plan and shall be coordinated at time of rough-in.

11. All exterior mounted light fixtures shall comply with current city or local lighting ordinance.

12. LED drivers for interior light fixtures shall provide full range dimming. Refer to the Lighting Fixture Schedule for the type of fixture being provided and provide a fully compatible dimming driver.

C. Conduit:

1. Rigid conduit shall be full weight threaded type aluminum or steel, except where specifically required to be steel. Steel conduit shall be protected by overall zinc coating to inside and outside surfaces, applied by the hot dip, metallizing or sherardizing process.

2. Galvanized Rigid Conduit (GRC), shall be full weight threaded type aluminum or steel, except where specifically required to be steel. Steel conduit shall be protected by overall zinc coating to inside and outside surfaces, applied by the hot dip, metallizing, or sherardizing process.

3. Intermediate Metal Conduit (IMC), shall be hot-dipped galvanized in accordance with UL 1242 and meeting Federal Specification WWC-581 (latest revision).

4. Electrical Metallic Tubing (EMT), shall be zinc-coated steel with baked enamel or plastic finish on inside surfaces.

5. Flexible metal conduit shall be constructed of aluminum or hot-dipped galvanized steel strips wound spirally with interlocking edges to provide greatest flexibility with maximum strength. Interior surfaces shall be smooth and offer minimum drag to pulling in conductors. Used only as directed by the Engineer.

6. Liquid-tight conduit (Seal-Tite) shall be galvanized steel flexible conduit as above except with moisture and oil-proof jacket, pre-cut lengths and factory installed fittings. For outdoor installations and motor connection.

7. Non-Metallic Conduit:
   a. Polyvinyl chloride (PVC) rigid conduit, Schedule 40, Type II for underground installation only.
   b. Conduit and fitting shall be produced by the same manufacturer.

8. Electrical non-metallic tubing (ENT) is not permitted.

D. Fittings:

1. Conduit bodies shall be smooth inside and out, taper threaded with integral insulating bushing and of the shapes, sizes and types required to facilitate installation or removal of wires and cables from the conduit and tubing system. These fittings shall be of metal, smooth inside and out, thoroughly galvanized, and sherardized cadmium plated.

2. Metallic conduit bodies covers shall have the same finish as the fitting and shall be provided for the opening of each fitting where conductor do not pass through the cover.

3. Connector, coupling, locknut, bushings and caps used with rigid conduit shall be steel, threaded and thoroughly galvanized. Bushings shall be insulated.

4. EMT fittings, connectors and couplings, shall be steel, zinc or cadmium plated, raintight, threadless, compression or tap-on multiple point, steel locking ring type with insulated throat.

5. Flexible steel conduit connectors shall be malleable iron clamp or squeeze type or steel twist-in type with insulated throat. The finish shall be zinc or cadmium plating.

6. Die cast, set screw or indenter type fittings are not acceptable.

7. Conduit unions shall be "Erickson" couplings, or approved equal. The use of running threads will not be permitted.

E. 600 Volt Conductors - Wire and Cable:

1. All conductors shall be stranded copper. Simpull type or equal.

2. Type THHN/THWN thermoplastic, 600 volt, UL approved, dry and wet locations, for conductor sizes up to and including #4 AWG.

3. Type XHHW cross-linked synthetic polymer, 600 volt, UL approved, for dry and wet locations, for conductor sizes #2 AWG. and above.

4. Cross-linked synthetic polymer, XHHW, 600 volts, UL approved, for installation underground, in concrete or masonry.

5. Wire and cable shall be new, manufactured not more than six (6) months prior to installation, shall have size, type of insulation, voltage rating and manufacturer's name permanently marked on outer covering at regular intervals.

6. Wire and cable shall be factory color coded by integral pigmentation with a separate color for each phase and neutral. Each system shall be color coded and it shall be maintained throughout.

7. Systems Conductor Color Coding:

   a. Power 208/120V, 3PH, 4W:

      (1) Phase A = Black
      (2) Phase B = Red
      (3) Phase C = Blue
      (4) Neutral = White

   b Ground Conductors:

      (1) Green

   c Communication/Signal/Fire Alarm System:

      (1) As recommended by the manufacturer.

8. Multi-Conductor metal clad (MC) cable shall be U.L. listed for the type of room, ceiling and/or wall it is being installed in and shall be provided with a ground wire sized per Article 250 of the CEC. MC cable is not permitted for exterior use.

9. For lighting circuits MC Luminary cable with integral 0-10V. control conductors shall be used.

10. Non-metallic sheathed cable (Romex) is not permitted.

11. All color coding for #4 conductor and above shall be as identified above, utilizing phase tape at each termination.

12. No conductors carrying 120 volt or more shall be smaller than #12 AWG.

F. Outlet Boxes:

1. For fixtures, boxes shall be galvanized, steel, knockout type equipped with 3/8" fixture studs and plaster rings where required.

2. Unless otherwise noted on plan or specified herein, outlet boxes shall be 4” square x 2 1/8” deep, steel, knockout type, mounted flush with wall. Provide with plaster rings and wall plate.

3. For data and combination telephone/data system outlets, outlet boxes shall be 4 11/16” square x 2 1/8” deep, steel, knockout type, mounted flush with wall. Provided with plaster rings and leave outlet box ready for installation of Owner furnished wall plate.

4. For audio-visual (A/V) system, outlet boxes shall be 5” square, steel, without knockouts, mounted flush with wall. Provide with custom plaster rings and leave outlet box ready for installation of A/V contractor furnished wall plate.

5. For all other communication/signal system devices, outlet boxes shall be as recommended by the system manufacturer and provided complete with plaster rings and covers.

6. For locations where standard boxes are not suitable due to number and size of conduit to be terminated, special boxes shall be designed to fit space or meet other requirements and submitted for approval.

7. For surface mounting or exposure to wet or damp locations, outlet boxes shall be heavy cast aluminum or cast iron with threaded hubs; covers shall be watertight with gaskets and non-

ferrous screws.

8. Floor boxes for on-grade applications shall be cast iron, fully adjustable type. Provide floor boxes with flange and brass covers suitable for the outlets/connectors specified on plan and in the project manual. Boxes shall be suitable for terminating the conduit specified on plan. Wiremold Omnibox series or approved equal to accommodate 1” conduit and smaller. Wiremold Resource RFB series or approved equal to accommodate conduits larger than 1”.

G. Switches:

1. Standard single pole switches shall be flush tumbler, A.C. rated, quiet type, heavy duty back or side wired with binding screws, standard rocker Hubbell #1221, 20A, 120/277V, or approved equal, color as elected by Architect. Two pole three-way and other switches shall be similar. Refer to Device Plate Section of Specifications for other requirements. Switches that are part of an automatic lighting control system shall be provided with integral, factory installed, connectors to accept the system control wiring, shall be manufactured by the automatic lighting control system manufacturer, and shall be fully compatible with the lighting control system.

2. Switches located outdoors or in damp or wet locations shall be the same as above provided with steel locking weatherproof lift cover.

3. Switches controlling or disconnecting single phase motor loads in excess of 1/3HP shall be horsepower rated and approved or motor control service. Switches shall be complete with overload device of proper motor nameplate rating, where required.

4. Disconnect (safety) switches shall be fused, heavy duty type meeting NEMA Specifications. Switches shall be provided with rejection type fuse blocks. Provide switches with the number of poles, the voltage, current and horsepower ratings as required. Provide externally operable, quickmake, quick-break type mechanism with cover interlock and padlockable in either the open or closed position. Unless indicated otherwise, provide switches indoors in NEMA Type 1 enclosure and in NEMA Type 3R enclosure where indicated to be outdoors or weatherproof. Provide nameplate indicating equipment served. Provide unit as manufactured by Eaton or approved equal to match the main switchboard manufacturer.

5. Occupant sensors shall be low voltage, dual technology type, suitable for ceiling or wall mounting. Stand-alone ceiling mounted sensors shall be provided complete with relay/power pack and slave-packs to perform the switching indicated on plan. Sensors that are part of an automatic lighting control system shall be provided with integral, factory installed, connectors to accept the system control wiring. Sensors shall provide minimum 1,000 square foot coverage and provide complete coverage of the areas indicated on plan. Stand-alone sensors shall be as manufactured by Sensor Switch, Watt Stopper or Leviton. System sensors shall be as manufactured by the automatic lighting control system manufacturer and shall be fully compatible with the lighting control system.

6. Occupant sensors located in hallways/corridors shall be programmed to automatically dim the lights to 50% when the space is unoccupied. Hallway/corridor sensors shall capable of detecting motion within a 130’-0” area. Stand-alone sensors shall be provided complete with relay/power pack and slave-packs.

7. Wall mounted, switch type, combination sensor and dimmer shall be dual technology type with single or dual circuit to provide the control indicated on plan. Sensors shall provide minimum 900 square feet major motion and 400 square feet minor motion coverage. Sensor shall have a multi-function tap switch with small, raised rocker, for dimmer adjustment. Sensors shall be as manufactured by Sensor Switch or approved equal Lutron, WattStopper or Leviton. Custom color as selected by the Architect. The contractor shall ensure the

dimmers are fully compatible with the LED drivers being controlled.

8. All switches, dimmers and sensors shall be listed and certified by the California Energy Commission.

H. Automatic Lighting Controls:

1. Provide a complete and fully operable wired control system as manufactured by Acuity nLight or approved equal Lutron or Wattstopper. For proposed alternate equipment to be considered the shop drawings must include a completely re-wired copy of the City approved lighting plan indicating the wiring, controls and connections to light fixtures required for the operation of the alternate system. The wiring and components from the specified system must be completely removed from the submitted shop drawings.

2. The wired control system shall be capable of receiving a demand response signal.

3. The lighting control system shall be provided complete with all required controllers, bridges, gateways, power supplies, occupant sensors, daylight sensors, dimmers/switches, power packs, wiring, and ancillary equipment/devices required for a fully operable system.

4. Automatic lighting control system dimmers/switches connected to emergency circuits shall be provided with wall plates with “red” engraved letters identifying the circuit being controlled.

5. The lighting control system shall be commissioned by the system’s manufacturer’s representative and programmed as required by the Owner.

6. Provide a minimum of four hours of training for personnel selected by the Owner. Training shall include a follow-up training session to be scheduled three (3) months after the initial training session is completed. All training shall be conducted at the Owner’s facility.

I. Receptacles:

1. Convenience outlet shall consist of duplex convenience receptacle mounted in an outlet box in the wall, flush with the finish surface and shall be complete with a mud ring and wall plate.

2. Receptacles for convenience outlets, unless otherwise indicated, shall be industrial heavy duty type, duplex 3W grounding type, 20A, 125V, Hubbell-Bryant #5362-*. (*) color as selected by Architect.

3. Receptacles in Dorm rooms, Captain’s Office, App Bay printer alcoves, and Dayroom shall be combination duplex, USB A and USB C charger/tamper resistant receptacle, 20A, 125V, Hubbell #USB20AC5*WR or approved equal. * = color as selected by Architect. Provide minimum one (1) USB receptacle at the workstation in offices and minimum of one (1) USB receptacle at each reclining chair in the Dayroom.

4. Receptacles in all other residential occupancies shall be industrial heavy duty type, tamper proof, 20A, 125V, Hubbell-Bryant #HBL5362*TR or approved equal, color as selected by Architect.

5. GFI receptacles shall be Hubell-Bryant #GFSG5362*, color as selected by the Architect. Contractor shall refer to the Code Analysis drawing in the Architectural contract documents for residential occupancies

6. Weatherproof receptacle shall be industrial heavy duty type, ground fault interrupter (GFI), 20 ampere, three wire grounding type, 120 volt, with steel lockable lift cover U.L. listed for “wet” locations when in operation.

7. Receptacles located within 6'-0" of a sink or in a wet location shall be GFI type.

8. Controlled receptacles for use in offices, conference rooms, lobbies, break rooms, and where indicated on plan, shall be factory engraved as "controlled". Hubbell #HBL5362LC1* series. Color as selected by the Architect.

9. Where a controlled receptacle is shown as part of a double duplex/quad assembly, the contractor shall provide one (1) industrial heavy duty duplex receptacle and one (1) fully controlled duplex receptacle Hubbell #HBL5362LC* series. Color as selected by the Architect.

10. Receptacles located outdoors shall be provided with steel weatherproof box and steel lockable lift cover U.L. listed for "wet" locations when in operation.

11. Receptacles in indoor damp locations shall be 20A, 125V, Hubbell-Bryant #HBL5362WR or approved equal, color as selected by Architect. Provide with steel locking lift cover, Hubbell-Bryant #96067 or approved equal.

12. Specialty receptacles, identified on plans, for use with Owner furnished equipment shall be provided complete with outlet box, wall plate and receptacle to match the configuration of the plug being provided with the subject equipment. Actual receptacle configuration shall be determined at time of rough-in.

J. Device Plates:

1. Shall be smooth thermoplastic wall plates, for the number of gang and types of openings necessary. Color shall be as selected by the Architect.

2. Plates shall be fitted, when specified for more than two gangs.

3. All switch and receptacle plates shall be engraved with related serving panel and circuit number identification on the front.

4. Plates for interior damp or wet areas, including kitchen/break rooms, shall be stainless steel, weatherproof, complete with neoprene gaskets.

5. Covers for exterior mounted receptacles shall be metallic, U.L. listed for wet locations when "in-use".

K. Junction and Pullboxes:

1. For interior dry locations, boxes shall be galvanized one-piece drawn steel, knockout type, with removable, machine screw secured covers.

2. Minimum depth for 4" and 5" junction/pull boxes shall be 2 1/8".

3. Minimum depth for junction/pull boxes larger than 5" shall be 4".

4. All boxes shall be sized for the number and sizes of conductors and conduits entering the box and equipped with plaster rings where required. Each conductor shall be terminated at an insulated, barriered terminal connector and completely identified with an engraved fiber identification marker, Electrovert or Underwriter's Safety Device Company.

L. Terminal Cabinets:

1. Terminal cabinets shall be fabricated of hot dipped galvanized code gauge sheet metal for flush or surface mounting, as indicated on plan. Unless specifically noted on plans otherwise, terminal cabinets shall be no smaller than 24” high, 30” wide and 6” deep. Doors shall be hinged and lockable. Locks shall be keyed to match the branch circuit panelboards. Terminal cabinet trims shall match the branch circuit panels.

2. Provide each terminal cabinet with a full size plywood backboard and terminal blocks (minimum 25% or 12 spare terminal blocks). All wires terminating on the terminal blocks shall be identified with an engraved fiber tag.

3. Surface mounted terminal cabinets shall be installed complete with full length skirts of the same construction and finish as the terminal cabinet.

4. Where mounted outdoors, terminal cabinets shall be NEMA 3R, weatherproof complete with gaskets and required sealant to prevent moisture from entering the terminal cabinet.

M. Plywood Backboards:

1. Where indicated for telephone or communications system terminals or other equipment assemblies, provide backboards to cover the entire wall it is attached to (full wall height and width).

2. Use Douglas Fir Plywood, exterior grade, finished one side and painted on all surfaces with intumescent gray paint. Unless otherwise indicated, use 3/4" thick plywood.

3. Where terminal cabinets are used, provide full size plywood backboard to mount inside the terminal cabinet.

N. Painting:

1. Terminal cabinets, panels, junction boxes, pull boxes, etc., and conduit installed outdoors and in public view shall be painted with colors selected by the Architect to match the subject exterior surface. Refer to painting section of the specifications for additional requirements.

O. Seismic Design and Anchoring of Electrical Equipment:

1. Seismic anchorage of electrical equipment shall conform to C.C.R. Title 24, 2025 CBC. Anchorage details for roof/floor mounted equipment shall be as shown on plans.

PART 3 - EXECUTION

3.1 PREPARATION AND INSTALLATION

A. Installation of Conduit and Outlet Boxes:

1. All conduit installed in concrete and masonry shall be galvanized rigid steel conduit (GRC), or intermediate metal conduit (IMC).

2. Rigid conduit may be installed under floor slabs, under concrete sidewalls and as noted on the Drawings. Rigid conduit installed under slabs shall be 1" trade size minimum and shall be wrapped with 20 mil. polyvinyl chloride plastic tape.

3. All conduit except as hereinafter specified, installed in concrete, masonry and block walls, or damp or hazardous location, or subject to mechanical injury shall be heavy wall, threaded, galvanized rigid steel conduit (GRC), or intermediate metal conduit (IMC). Installation of conduit in block walls shall be approved by the Structural Engineer prior to rough-in.

4. Flexible steel conduit shall be permitted to be used at light fixture outlets, building seismic separations, and connections to vibrating electrical equipment. Flexible steel conduit runs shall be less than 6'-0". All outdoor installation shall be made using liquid-tight flex with approved fittings. Use of flexible conduit shall be as approved by the Engineer.

5. MC Luminary cable may be used at light fixture outlets. Cable runs shall be less than 6'-0".

6. Intermediate metal conduit (IMC), is approved for use in all locations as approved for GRC or EMT and in accordance with Article 345 of CEC and UL Information card #DYBY.

7. All conduit installed in the dry walls or ceilings of the building shall be steel tube (EMT), Galvanized Rigid Steel (GRC), or Intermediate Metal Conduit (IMC).

8. NM sheathed cable is not allowed.

9. Conduit shall be run so as not to interfere with other piping fixtures or equipment.

10. The ends of all conduit shall be cut square, carefully reamed out to full size and shall be shouldered in fitting.

11. No running threads will be permitted in locations exposed to the weather, in concrete or underground. Special union fittings shall be used in these locations.

12. Underground conduit shall be, unless otherwise indicated, Schedule 40 PVC (polyvinyl chloride) installed at depth of not less than 24" below grade, concrete encased with a minimum of 3” concrete envelope and 2” minimum between conduits. Conduit separation shall be maintained using plastic spacers located at 10'-0" intervals. Where power and communication/signal conduits are run in a common trench a (12") inch minimum separation shall be maintained between power and communication/signal conduits. The grounding wire in plastic conduit shall be rated in accordance with Article 250 of 2025 CEC. Conduit encasement will not be required for conduits installed under the building slab (building footprint).

13. All underground or imbedded conduit shall be 1" minimum trade size for steel and for PVC.

14. Where underground power feeder conduit runs stub-up, conduit shall transition to GRC underground. The contractor shall use GRC elbows and GRC risers wrapped in 20 mil. PVC tape for stub-ups. Conduit stub-ups for branch circuits and low voltage systems shall be PVC.

15. Underground stub-ups at footings shall be installed in compliance with the Structural Engineer’s requirements.

16. PVC conduit shall not be run in walls or aboveground.

17. Where underground conduit runs penetrate floor slab, conduit shall terminate 6” above finished floor with a grounding bushing.

18. Underground stub-ups at the generator shall extend, unbroken, 20” above finished grade.

19. Underground conduit shall not be run under the generator or fuel tank.

20. Where conductors enter a raceway in a cabinet, pull box, junction box, or auxiliary gutter, the conductors shall be protected by a plastic bushing type fitting providing a smoothly rounded insulating surface.

21. Where conduit extends through roof to equipment on roof area, this Contractor shall provide 24 gauge galvanized sheet metal flashing cones with 4" flanges on roof surface. This flashing shall be delivered to the roofing contractor for installation. The actual location of all such roof penetrations and outlet shall be verified by the Contractor.

22. All conduit underground, in masonry and concrete walls, and where concealed under floor slabs shall have joints painted with thread compound prior to makeup. Conduit shall not be installed horizontally in concrete floors.

23. Conduit run in block walls shall be installed as required by the Structural Engineer. Refer to Structural block wall installation details for allowable methods of conduit in the block walls of the building.

24. All conduit shall be supported at intervals not less than 6'-0" and within 12" from any outlet and at each side of bends and elbows. Conduit supports shall be galvanized, heavy stamped, two hole conduit clamp properly secured.

25. Where conduit racks are used the rack shall consist of two piece conduit clamps attached to galvanized steel slotted channels, properly secured via threaded rods attached directly to the building structure.

26. Nail-in conduit supports and staples will not be allowed. One piece set-screw type conduit clamps or perforated iron for supporting conduit will not be permitted.

27. Seismic Conduit Support:

    a. All conduit shall be supported in such a manner that it is securely attached to the structure of the building. Attachment is to be capable of supporting the tributary weight of conduit and contents in any direction. Maximum spacing of support and braces are to be as follows:

CONDUIT TYPE	MAXIMUM SPACING
EMT, IMC	10'-0"
GRC (3/4” thru 1 ½”)	10'-0"
GRC (2” thru 2½”)	16'-0"
GRC (3” and larger)	20'-0"

28. All conduit runs shall be installed parallel or perpendicular to walls, structural members, or intersection of vertical planes and ceilings, and installed in a neat, workmanlike manner, without offsets/jogs or crisscrossing. Field made bends and offset shall be avoided where possible. Crushed or deformed raceway shall not be installed.

29. Open knockouts in outlet boxes only where required for inserting conduit. Unused openings shall be sealed using factory fittings.

30. Outlet boxes on metal studs shall be attached to metal hangers, tack welded or bolted to studs; on wood studs attachment shall be with wood screws, nails not acceptable.

31. All boxes shall be covered with outlet box protector, Appleton SB-CK. Keep dirt from entering box or panels. If dirt does get in, it shall be removed prior to pulling wires.

32. All boxes installed outdoors shall be suitable for outdoor installations, gasketed, screw cover and painted as directed by the Architect with weatherproof paint to match building.

33. All conduit entries to outdoor mounted panels, cabinets, boxes, etc., shall be made using Myers "SCRU-TITE" hubs Series ST.

34. All conduit shall have a 200 lb test poly-propylene pull line left in place for future use in all runs tagged with a plastic tag at terminating end indicating the location of the opposite end of the conduit.

35. All rotating electrical equipment shall be supplied with flexible, liquid-tight conduit with appropriate slack and shall not exceed thirty-six (36) inches.

36. All multiple conduit runs within suspended ceilings shall be suspended from building structure by means of unistrut hangers/rack, see note 25. Refer to note 24 for support of single conduit runs within suspended ceilings. Conduit shall not be allowed to lay on ceiling or be supported from ceiling suspension wires or other suspension system.

37. Provide complete conduit system for all line voltage systems. Provide conduit for low voltage systems installed over inaccessible ceilings and in rooms with no dropped ceilings (open ceilings). The Contractor shall coordinate the location of inaccessible or open ceilings with the Architectural Reflected Ceiling Plan and in the filed with the ceiling contractor prior to rough-in.

38. All raceways shall be installed concealed in walls, floors or ceilings. Exposed raceways shall be permitted only in open ceiling (no T-bar or hard-lid ceiling) areas, unless specifically approved in writing by the Architect/Engineer. When approved by the Architect/Engineer exposed raceways in public spaces shall be as manufactured by Wiremold or approved equal, conduit may be used in utility spaces. Exposed raceways shall be painted to match the finish of the surface to which it is supported to.

39. Provide minimum 18” square ceiling access panels for devices, outlets, junction/pull boxes installed over inaccessible ceilings. Refer to the Architectural Reflected Ceiling plans for location of hard-lid/gyp board ceilings.

40. Install two (2) 2”C. sleeves in the common wall between the ceiling space of a room on the other side of a corridor. The sleeves shall be used for routing of low voltage wire/cable thru full height walls and fire rated walls. Sleeves shall be sealed to prevent transmission of noise between the room and the corridor.

41. Install four (4) 2”C. sleeves in each of the common walls between the ceiling space of the Communications room and the adjacent corridor. The sleeves shall be used for routing of low voltage wire/cable thru the full height walls and fire rated walls. Sleeves shall be sealed to prevent transmission of noise between the room and the corridor.

B. Installation of Conductors:

1. All line voltage wire, including control circuits, shall be installed in conduit.

2. All communications wire/cable shall be listed for open wiring (without conduit) and shall be plenum rated. Communications wire/cable shall be supported by “J” hooks installed along the perimeter walls of the building or full-height interior walls. Low voltage wiring installed over inaccessible ceilings shall be installed in conduit. Conduit shall be sized for the quantity of wire/cables contained therein and in compliance with the CEC. Communications wire/cable installed below grade shall be U.L. listed for the application.

3. All line voltage circuits and feeder wires shall be continuous from the service point to terminal or farthest outlet. No joints shall be made except in pull, junction or outlet boxes, or in panel or switchboard gutters.

4. All low voltage wire/cables shall be continuous from the service point to terminal or farthest outlet. No joints will be allowed.

5. Thoroughly clean all conduit and wire-ways and see that all parts are perfectly dry before pulling any wires. No line voltage joint shall be made except in pull, junction or outlet boxes, or in panel or switchboard gutters.

6. Provide conduit only for routing of HVAC control wiring. Refer to Mechanical drawings for conduit requirements.

7. Install UL approved, fixture wire from all lighting fixture lamp sockets into fixture outlet or junction box.

C. Joints in 600 Volt Conductors:

1. Joints in 600 volt conductors smaller than No. 4 AWG shall be made with Scotchlok spring type connectors. Wires No 4 AWG and larger shall be joined together with approved type of pressure connector and taped with #33 3M tape, three (3) layers minimum to provide insulation not less than that of conductor. Connections to switch or busbar shall be made with one-piece copper lugs. Splicing of all 600 volt or less in-line connections #2 AWG through 350 MCM shall be made with 3M brand PST connector.

2. Joints/splices will not be permitted in underground pull boxes unless specifically authorized by the Engineer.

D. Grounding:

1. Provide grounding for entire electric installation as shown on plans and as required by applicable codes. Included as requiring grounding are:

   a. Conduit.
   b. Neutral or identified conductors of interior wiring system.
   c. Switchboards, Power Distribution Panels and Branch Circuit Panelboards.
   d. Non-current carrying metal parts of fixed equipment.
   e. Telephone distribution equipment.

2. Ufer ground shall be provided at the building's "service" panel to meet the resistance specified herein. The size of the ufer grounding conductor shall be not less than that set forth in the latest edition of the California Code of Regulations, Title 24, State of California and CEC, unless otherwise indicated.

3. Grounding and bonding conductors shall be sized per the latest edition of the California Code of Regulations, Title 24, State of California and the CEC.

4. Provide and install an equipment grounding conductor in all feeder and branch circuit conduits.

5. Where required to be installed, ground rods shall be 3/4" x 10', copper clad, installed individually or grouped as required to meet the specified resistance. Provide ground rods with all required clamps, fittings, wire and concrete boxes.

6. Building grounding system resistance to ground shall not exceed 25 Ohm. Grounding resistance at the telephone back-board or MDF shall not exceed 5 Ohm.

E. Prefabricated Equipment: Installation of all prefabricated items and equipment shall conform to the requirements of the manufacturer's specifications and installation instruction pamphlets. Where code requirements affect installation of materials and equipment, the more stringent requirements, code or manufacturer's instructions and/or specifications, shall govern the work.

END OF SECTION

SECTION 26 05 73 OVERCURRENT PROTECTIVE DEVICE COORDINATION STUDY

PART 1 GENERAL

1.1 SUMMARY

A. Section includes arc flash study and short circuit and protective device coordination study encompassing the electrical distribution system from emergency and normal power sources up to and including circuit breakers in the service entrance switchboard, sub-distribution panels, circuit breakers in each switchboard/panelboard, and circuit breaker provided with the generator.

B. Adjustable circuit breaker settings and non-adjustable circuit breaker selections shall be based on the results of the coordination study to ensure a local fault does not trip any upstream circuit breaker. Refer to 26 05 73 Item 1.7 for additional requirements.

C. Panel and circuit breaker short circuit ratings shall be based on the results of the study's short circuit calculation results.

D. Provide arc-flash labels for switchboards and panels. Labels shall indicate the nominal system voltage, arc flash PPE category, arc flash boundary, minimum arc rating of clothing.

E. Study shall be performed by the Contractor's third party consultant.

1.2 REFERENCES

A. Institute of Electrical and Electronics Engineers:
   1. IEEE 242 - Recommended Practice for Protection and Coordination of Industrial and Commercial Power Systems (Buff Book).

B. National Fire Protection Association:
   1. NFPA 70 - California Electrical Code.

1.3 DESIGN REQUIREMENTS

A. Complete Short Circuit and Protective Device Coordination Study to meet requirements of NFPA 70.

B. Report Preparation:
   1. Prepare study prior to ordering distribution equipment to verify equipment ratings required.
   2. Perform study with aid of computer software program.
   3. Obtain actual settings for packaged motor characteristics for equipment incorporated into Work.
   4. Calculate short circuit interrupting and, when applicable, momentary duties for assumed 3-phase bolted fault short circuit current and phase to ground fault short circuit current at each of the following:
      a. Utility supply bus.
      b. Automatic transfer switch.
      c. Engine generator.
      d. Low-voltage switchgear.
      e. Switchboards.
      f. Distribution panelboards.
      g. Branch circuit panelboards.

h. Each other significant equipment location throughout system.

C. Report Contents:
1. Include the following:
a. Calculation methods and assumptions.
b. Base per unit value selected.
c. One-line diagram.
d. Source impedance data including power company system available power and characteristics.
e. Typical calculations.
1) Fault impedance.
2) X to R ratios.
3) Asymmetry factors.
4) Motor fault contribution.
5) Short circuit kVA.
6) Symmetrical and asymmetrical phase-to-phase and phase-to-ground fault currents.
7) Tabulations of calculation quantities and results.
f. One-line diagram revised by adding actual instantaneous short circuits available.
g. State conclusions and recommendations.
2. Prepare time-current device coordination curves graphically indicating coordination proposed for system, centered on conventional, full-size, log-log forms.
3. Prepare with each time-curve sheet complete title and one-line diagram with legend identifying specific portion of system covered by that particular curve sheet.
4. Prepare detailed description of each protective device identifying its type, function, manufacturer, and time-current characteristics. Tabulate recommended device tap, time dial, pickup, instantaneous, and time delay settings.
5. Plot device characteristic curves at point reflecting maximum symmetrical fault current to which device is exposed. Include on curve sheets the following:
a. Power company relay characteristics.
b. Power company fuse characteristics.
c. Low voltage equipment circuit breaker trip device characteristics.
d. Low voltage equipment fuse characteristics.
e. Cable damage point characteristics.
f. Pertinent transformer characteristics including:
1) Transformer full load current.
2) Transformer magnetizing inrush.
3) ANSI transformer withstand parameters.
4) Significant symmetrical fault current.
g. Pertinent motor characteristics.
h. Other system load protective device characteristics.

1.4 SUBMITTALS

A. Qualifications Data: Submit the following for review prior to starting study.
1. Submit qualifications and background of firm.
2. Submit qualifications of Professional Engineer performing study.

B. Software: Submit for review information on software proposed to be used in performing study.

C. Product Data: Submit the following:
1. Report: Summarize results of study in report format including the following:

a. Descriptions, purpose, basis, and scope of study.
b. Tabulations of circuit breaker, fuse and other protective device ratings versus calculated short-circuit duties, and commentary regarding same.
c. Protective device time versus current coordination curves, tabulations of relay and circuit breaker trip settings, fuse selection, and commentary regarding same.
d. Fault current calculations including definition of terms and guide for interpretation of computer printout.

D. Submit copies of final report signed by professional engineer. Make additions or changes required by review comments.

1.5 QUALITY ASSURANCE

A. Perform Work in accordance with CEC requirements.

B. Maintain one copy of each document on site.

C. Use commercially available software, designed specifically for short circuit and protective device coordination studies with minimum of five years documented availability.

D. Perform study in accordance with IEEE 242.

1.6 QUALIFICATIONS

A. Study Preparer: Company specializing in performing work of this section with minimum five years documented experience and having completed five projects of similar size and complexity within the past two years.

B. Perform study under direct supervision of Professional Engineer experienced in design of this Work and licensed in State of California with minimum of five years experience in power system analysis.

C. Demonstrate company performing study has capability and experience to provide assistance during system start up.

1.7 SEQUENCING

A. Submit short circuit and protective device coordination study to Architect/Engineer prior to receiving final approval of distribution equipment shop drawings and prior to releasing equipment for manufacturing.

B. When formal completion of study will cause delay in equipment manufacturing, obtain approval from Architect/Engineer for preliminary submittal of study data sufficient in scope to ensure selection of device ratings and characteristics will be satisfactory.

1.8 SCHEDULING

A. Schedule work to expedite collection of data to ensure completion of study for final approval of distribution equipment shop drawings prior to release of equipment for manufacturing.

1.9 COORDINATION

A. The professional performing the study shall be responsible for contacting the serving utility company and obtaining all values required for the completion of the overcurrent protective device coordination study.

B. The professional performing the study shall be responsible for contacting the generator manufacturer and obtaining the manufacturer and trip curves for the circuit breakers being provided with the generator and including the generator circuit breakers in the overcurrent protective device coordination study.

PART 2 PRODUCTS

Not used.

PART 3 EXECUTION

3.1 FIELD QUALITY CONTROL

A. Provide assistance to electrical distribution system equipment manufacturer during start up of electrical system and equipment.

3.2 ADJUSTING

A. Perform field adjustments of protective devices and modifications to equipment to place equipment in final operating condition. Adjust settings in accordance with approved short circuit and protective device coordination study.

END OF SECTION

SECTION 26 24 13 SWITCHGEAR

PART 1 - GENERAL

1.1 SCOPE

A. Work of this section includes everything necessary for or incidental to completing the electrical work, to provide a complete and operable electrical system, except as herein specifically excluded.

1.2 GENERAL REQUIREMENTS

A. Electrical System Characteristics: 120/208V. 3PH, 4W.

B. Guarantee: Furnish a written guarantee for a period of one-year from date of acceptance.

C. Codes and Regulations: Work done under this Section shall comply with the latest edition of the following: California Electrical Code, State of California Title 24, State Building Standards, Occupational Safety and Health Administration (OSHA) requirements, State of California Title 17 and to all local codes having jurisdiction. In the case where the codes have different levels of requirements, the most stringent rule shall apply.

D. The General and Supplementary Conditions, as well as Special Conditions apply in addition to items in the Electrical Section. Special attention is directed to the following sections:

1. Drawings and Specifications at the site.

2. Shop drawings and samples.

3. Guarantee.

4. Tests.

E. Testing:

1. Shall be in accordance with NETA ATS.

2. Copies of factory tests shall be submitted for review.

3. All certified test reports shall be submitted to the Owner at completion of project.

F. Shop Drawings/Product Submittals:

1. Drawings shall be submitted in six (6) bound sets accompanied by Letter of Transmittal, which shall give a list of the number and dates of the drawings submitted. Drawings shall be complete in every respect and bound in sets.

2. The Drawings submitted shall be marked with the name of the project, numbered consecutively and bear the approval of the Contractor as evidence that the Drawings have been checked by the Contractor. Any Drawings submitted without this approval will be returned to the Contractor for resubmission.

3. If the shop drawings show variations from the requirements of the Contract because of standard shop practice or other reasons, the Contractor shall make specific mention of such variations in his letter of transmittal. If the substitution is accepted, the Contractor shall be responsible for proper adjustment which may be caused by the substitution. Complete

working samples shall be submitted with all requests for substitution.

4. Shop drawings/product data shall be submitted on the following but not limited to:

    a. Switchgear accompanied by a copy of the Overcurrent Protective Device Coordination Study.

    b. Circuit breakers accompanied by a copy of the Overcurrent Protective Device Coordination Study.

5. Shop drawings shall include enclosure elevations indicating the location of all equipment, and one-line diagram.

1.3 IDENTIFICATION

A. In addition to the factory installed nameplate. Each feeder circuit breaker shall be provided with a nameplate indicating the load served. If no load is served the nameplate shall read “Spare”.

B. Nameplates shall be Micarta 1/8" thick and of approved size, with bevelled edges and engraved white letters 1/4" high minimum on black background. Each nameplate shall be provided with drillings and suitable mounting screws corresponding to finish of the nameplate. The inscriptions in each nameplate shall be as indicated on the Drawings.

1.4 MAINTENANCE, SERVICING, INSTRUCTION MANUALS AND WIRING DIAGRAMS

A. Prior to final acceptance, the Electrical Contractor shall furnish to the Owner at least four (4) copies of operating and maintenance and servicing instructions, as well as four (4) complete sets of wiring diagram.:

B. Wiring diagrams shall project specific. Two (2) copies shall be presented to the Electrical Engineer and four (4) copies to the Owner.

1.5 ELECTRICAL CONTRACTOR'S RESPONSIBILITY

A. After all requirements of the Specifications and/or the Drawings have been fully completed, representatives of the Owner will inspect the work. Contractor shall provide competent personnel to demonstrate the operation of any item or system to the full satisfaction of each representative.

B. Final acceptance of the work will be made by the Owner after receipt of approval and recommendation of acceptance from each representative.

1.6 SUBSTITUTIONS

A. Substitution to specified equipment shall be submitted and received by the Engineer fifteen (15) days after the bid date for review and approval.

B. To receive consideration, requests for substitutions must be accompanied by documentary proof of its equality with the specified material. Documentary proof shall be in letter form and identify the specified values/materials alongside proposed equal values/materials. In addition, catalog brochures and samples must be included in the submittal.

C. The Contractor warrants that substitutions proposed for specified items will fully perform the functions required.

D. Substitutions or requests for substitution shall not be accepted and rejected for failure to comply with items A-C above.

PART 2 - PRODUCTS

2.1 MATERIALS

A. Materials and Equipment: All electrical materials and equipment shall be new and shall be listed by Underwriter's Laboratories and bear their label, or listed and certified by a nationally recognized testing authority where UL does not have an approval. Custom made equipment must have complete test data submitted by the manufacturer attesting to its safety. In addition, the materials and equipment shall comply with the requirements of the following:

1. American Society of Testing Materials (ASTM).

2. Institute of Electrical and Electronics Engineers (IEEE).

3. National Electrical Manufacturer's Association (NEMA).

4. American National Standard Institute (ANSI).

5. International Electrical Testing Association (NETA).

B. Switchboard (including solid state trip main circuit breaker).

1. Provide switchboard with rating, components, dimensions and features as indicated on the Drawings. Switchboard shall consist of a solid state trip main circuit breaker and thermal-magnetic, ambient compensated, bolt-on type circuit breakers in a floor-standing, dead front, totally metal enclosed, NEMA 1 enclosure, requiring front access only. All sections shall be constructed of code gauge sheet metal. Sections shall consist of one (1) combination underground pull section and utility meter, one (1) main service disconnect/circuit breaker and distribution section. Switchboard and switchboard components shall be as manufactured by Eaton or approved equal Siemens or Square D. Proposed alternate manufactured equipment must meet the configuration described herein and must fit in the electrical room without causing a re-design of the equipment in the room. Equipment manufactured by third party OEM is not acceptable.

2. Busbars:

   a. Busbars shall be rectangular cross-section copper with silver-plated joints, full-height in each vertical section with horizontal cross busbars between sections. Bus bracing shall not be less than short-circuit indicated on the Drawings or utility requirements. Provide all lugs suitable for copper conductors. Shop drawings must show lug sizes based on the actual conductors to be provided.

   b. Copper neutral busbar shall be 100% rated and shall have terminals for all active, spare, or inactive circuits.

   c. Copper ground busbar shall be full length with provisions for future length extension.

3. The main circuit breaker shall be molded case type and have short circuit interrupting capacity of 65,000 AMPS symmetrical or per serving utility's requirements, whichever is greater. Provide solid state trip units with long-time and short-time and field functional test set. Circuit breaker long-time and short-time settings shall be factory set based on the Overcurrent Protective Device Coordination Study required by Section 26 05 73.

4. Provide screw-on nameplates for the main circuit breakers and the switchboard cover.

5. Nameplates shall be 1/8" thick, Micarta or Lamacoid plate or approved size, with bevelled edges and engraved white letters on black background.

6. Provide Arc-Fault warning labels on switchboard front cover. Refer to Section 26 05 73 for additional requirements.

7. All circuit breakers shall be provided with a lock "OFF" device, and terminals/lugs UL listed for 75˚C.

8. Refer to Section 26 05 73 for additional requirements. Switchgear and the overcurrent protective device coordination study must be submitted concurrently. A Switchgear submittal that does not include the overcurrent protective device coordination study will be considered incomplete.

C. Panelboards - Power Distribution:

1. Power distribution panelboards shall be floor mounted, dead front, totally metal enclosed, NEMA 1 enclosure, requiring front access only equipped with thermal-magnetic bolt-on type circuit breakers. Panels shall be minimum 36" wide, 24" deep and 90" high unless otherwise required by quantity of circuits indicated on the Single Line Diagram. Panelboard and panelboard components shall be as manufactured by Eaton or approved equal Siemens, or Square D to match the main switchboard manufacturer. Proposed alternate manufactured equipment must meet the configuration described herein and must fit in the electrical room without causing a re-design of the equipment in the room. Equipment manufactured by third party OEM is not acceptable.

2. Circuit breakers shall be fully rated to provide the symmetrical interrupting capacity indicated on the single line diagram. Circuit breakers shall be the number of poles and current capacity as indicated on the single line diagram. Circuit breakers shall be fully coordinated to ensure a local fault does not trip any upstream circuit breaker.

3. Provide screw-on nameplates for all feeder circuit breakers and the panelboard cover. Nameplates shall be 1/8" thick, Micarta or Lamacoid plate or approved size, with bevelled edges and engraved letters. For panels connected to normal power sources: Provide white letters on black background. For panels connected to emergency power sources: Provide white letters on red background.

4. All wiring shall be neatly arranged and laced together.

5. All circuit breakers shall be provided with a lock "OFF" device, and terminals/lugs UL listed for 75˚C.

6. Copper neutral busbar shall be 100% rated and shall have terminals for all active, spare, or inactive circuits.

7. Phase, neutral and ground bus bars shall be full size/height, rectangular in cross section, constructed of copper and interconnections.

8. Provide Arc-Fault warning labels on panel front covers. Refer to Section 26 05 73 for additional requirements.

9. Refer to Section 26 05 73 for additional requirements. Distribution panels and the overcurrent protective device coordination study must be submitted concurrently. A panel submittal that does not include the overcurrent protective device coordination study will be considered incomplete.

D. Panelboards – Branch Circuit:

1. Branch circuit panelboards shall be of the dead front safety type equipped with thermal-magnetic bolt-on type 40 deg C. circuit breakers. Panels shall be suitable for the disaggregation of loads with provisions for the installation of future current transformer (CT's). Enclosure shall be minimum 20" wide and 5-3/4" deep unless otherwise noted on plan. Refer to panel schedule for ratings and quantity of circuits to be provided. Panels shall be provided with copper busses. Branch circuit panelboards shall be Eaton or approved equal Siemens, or Square D to match the main switchboard manufacturer. Equipment manufactured by third party OEM is not acceptable.

2. Circuit breakers shall be fully AIC rated. Circuit breakers shall be the number of poles and current capacity as indicated on the panel schedule with terminals/lugs UL listed for 75˚C. Circuit breakers shall be fully coordinated to ensure a local fault does not trip any upstream circuit breaker.

3. Circuit breakers used to protect circuits serving the "R" occupancies of the Fire Station shall be arc-fault type. Refer to the Code Analysis sheet for occupancy separations.

4. Trims shall have doors equipped with flush type combination lock and catch, two milled type keys supplied with each panel. All locks shall be keyed alike and each door shall have a plastic covered directory frame with a typed identification card of all circuit and panel numbers for branch circuit panelboards and engraved lamacoid nameplates for power distribution panelboards.

5. Provide nameplate for all panelboards, 1/8" thick, Micarta or Lamacoid plate of approved size, with bevelled edges and engraved white letters on black background. Install nameplates on exterior trim of panel, above the panel door. For panels connected to normal power sources: Provide white letters on black background. For panels connected to emergency power sources: Provide white letters on red background.

6. All wiring shall be neatly arranged and laced together.

7. All circuit breakers shall be provided with a device for locking circuit breaker in "OFF" position.

8. Refer to Painting Section of these Specifications for all panel finish. Panel shall be primered for painting.

9. Copper neutral busbar shall be 100% and shall have terminals for all active, spare, or inactive circuits.

10. Phase, Neutral, and Ground bus bars shall be full height/size, rectangular in cross section constructed of copper and interconnections.

11. Provide Arc-Fault warning labels on panel front covers. Refer to Section 26 05 73 for additional requirements.

12. Where indicated on plan, panels housing time clocks and contactors for control of lighting shall be provided with an auxiliary section. Panel shall consist of a two-section panelboard with two boxes and one trim/cover, each with their own door/lock.

13. Refer to Section 26 05 73 for additional requirements. Panelboards and the overcurrent protective device coordination study must be submitted concurrently. A Panelboard submittal that does not include the overcurrent protective device coordination study will be considered

incomplete.

E. Painting:

1. Switchboards installed outdoors and in public view shall be painted with colors selected by the Architect to match the subject exterior surface. Refer to painting section of the specifications for additional requirements.

F. Seismic Design and Anchoring of Electrical Equipment:

1. Seismic anchorage of electrical equipment shall conform to C.C.R. Title 24, 2025 CBC. Anchorage details for roof/floor mounted equipment shall be as shown on plans.

PART 3 - EXECUTION

3.1 PREPARATION AND INSTALLATION

A. Verify surface is suitable for switchboard installation.

B. Install in accordance with NEMA PB 2.1.

C. Tighten accessible bus connections and mechanical fasteners after placing switchboard.

D. Ground and bond switchboards in accordance with CEC Article 250.

E. Adjust operating mechanisms for free mechanical movement.

F. Tighten bolted bus connections.

G. Adjust circuit breaker trip and time delay settings to values.

H. Touch up scratched or marred surfaces to match original finish.

END OF SECTION 26 24 13

SECTION 26 31 00 - PACKAGED PV SYSTEM

PART 1 - GENERAL

1.01 SCOPE OF WORK

A. This section shall consist of providing a design-build packaged PV system with battery storage and all accessories as specified and required by the 2022 California Energy Commission Title 24. The equipment supplier must be the authorized distributor for each component of the products specified herein. The work includes the furnishing of all labor, materials, equipment, test, and training to provide a complete and workable solar power generating system, including the PV modules, inverters, conduit and equipment labeling, system monitoring, PV module support system and interconnecting conduit/wire, and specified herein. It is the intent of these specifications to have a single source responsibility for the PV modules, inverter, battery storage and support structure.

B. Any and all exceptions to the published specifications shall be subject to the approval of the engineer.

C. The power generating system shall be furnished by a solar integrator (contractor) who shall be responsible for the installation, coordination, and testing of the complete system. The contractor shall have documentary proof of being in business for ten (10) years and installed a minimum of ten (10) systems of equal or greater size. The entire system shall be installed as shown on the plans, drawings, and specifications herein.

D. The equipment shall be produced by a manufacturer who has produced this type of equipment for a period of at least 10 years and who maintains a service organization available twenty-four hours a day throughout the year.

E. The equipment shall be produced by a manufacturer who is ISO 9001 certified for the design, development, production, installation, and service of the complete product line.

F. Complete and submit utility company interconnect agreement and required documentation (plans, diagrams, specifications and equipment data sheets) to the serving utility company for approval.

G. Secure and pay for required permits and approvals from the serving utility company.

H. Complete and submit utility company, State and local incentive/rebate program applications.

I. The PV system is the sole responsibility of the contractor. The PV contractor shall submit plans, equipment data sheets, wiring diagrams and calculations to the authority having jurisdiction (AHJ) for review and approval. The PV system submittal to the AHJ shall bear the stamp and signature of a professional engineer registered in the State of California.

J. Installation of the PV system shall commence upon approval of the PV plans by the AHJ.

K. Manufacturer model numbers included in Section 263100 were used to determine the system kW size and kWH production. Actual equipment to be used to meet the system size and production shall be determined by the design-build contractor and submitted to the Engineer of Record for review prior to submittal to the Plan Check agency and utility company.

1.02 GENERAL REQUIREMENTS

A. It is the intent of this specification to secure an electrical power generating system that has been tested during design verification, production and at the final job site. All finished

equipment shall be of the lasted commercial design and will be complete with all of the necessary accessories for complete installation as shown on the plans, drawings, and specifications herein. The equipment supplied and installed shall meet the requirements of the 2022 California Electrical Code, along with all applicable local codes and regulations. All equipment shall be new and of current production of a national firm that manufactures PV modules, inverters and assembles them as a complete and coordinated system. There will be one source responsibility for warranty, parts, and service through a local representative with factory-trained servicemen.

B. The electrical power generating system shall be rated 8.8 kW (STC). System output may range between 10,870 kWh and 11,504 kWh per year.

C. Refer to Section 260000 for Submittal requirements.

1.03 RELATED DOCUMENTS

A. The following specification section apply to all work herein:

1. Section 260000 – General Electrical Requirements.

1.04 SUBMITTAL AND MANUALS

A. Comply with all requirements of the General Conditions, Supplementary Conditions and applicable sections of Divisions 1 and 16 of these specifications.

B. Additional requirements of this section are:
1. Within thirty-five (35) calendar days after the date of award of the Contract, the Contractor shall submit to the Architect for review, eight copies of a complete submission.
2. The submission shall consist of five major sections with each section separated with index tabs. Each page in the submission shall be numbered chronologically and shall be summarized in the index.
3. The first section shall be the "Index" which shall include the project title and address, name of the firm submitting the proposal and name of the Architect.
4. The second section shall include a copy of the Installing Contractors valid C-10 California State Contractors License, letters of factory authorization and guaranteed service, list of 10 projects of equal scope and list of proposed instrumentation to be used by the Contractor.
5. The third section shall contain the comparative specification listing, including a complete listing of the characteristics of the equipment to be furnished next to all of the specified equipment's features and functions as stated in the specifications and data sheets.
6. The fourth section shall contain an original factory data sheet for every piece of equipment in the specifications.
7. The fifth section shall contain a wiring designation schedule for each circuit leaving each piece of equipment and drawings showing system wiring plans.
8. The submittal shall also include, but not be limited to, a site plan indicating site distribution of system wire/cable, floor plans indicating location of equipment, system devices, required wire/cable between equipment and devices, site specific wiring/connection diagrams, system three-line diagram, equipment elevations indicating dimensions and the arrangement/placement of all wall/floor mounted equipment. Calculations for the PV system kW size, battery storage system, annual kWH production.
9. Submit installation details and structural calculations for the attachment of the roof mounted PV support system, PV module attachment to the support system, inverter and battery cabinet.

C. The Contractor shall provide two copies of an "Operating and Servicing Manual" for the system. The manuals shall be bound in flexible binders. All data shall be printed material or

typewritten. Each manual shall include the following: Instructions necessary for the proper operation and servicing of the system; complete as-built installation drawings of the system; a wiring destination schedule for each circuit leaving for each piece of equipment; a schematic diagram of major components with all transistor and IC complements and replacement number.

PART 2 - PRODUCTS

2.01 INVERTER:

A. 208V. 3 phase, transformerless, string inverter with integral AC and DC disconnect switches, DC arc-fault protection, integrated DC fused string combiner, and 96.5% CEC efficiency. As manufactured by Sol-Ark #30K-3P-208V, or approved equal.

2.02 PV MODULES

A. Modules shall be as manufactured by Phono Solar, 550W Twinplus Module, or approved equal by the project Electrical Engineer.

B. Module shall meet UL 61730 requirements, shall carry the CE mark and meet IEC 61215 and IEC 61730 standards.

C. Module shall have a 25 year power performance warranty for 80% of warranted minimum power.

D. Construction:
   I. Front – Solar glass with anti-reflective surface treatment, 3.2mm (0.13”).
   II. Back Sheet – Highly resistant polymer (black).
   III. Frame – 1.5 mm Anodized aluminum (black).

E. The terminal box shall have integral built-in bypass diode protection (to preserve array output power during periods of local shading). The junction box shall be weather resistant, watertight, UV and microbe resistant and meet IEC 61215 edition 2 design. The junction box will have positive and negative, 12 AWG, dual insulated cables with UL listed polarized weatherproof connectors. Connectors will be IP65 designed and meet 2022 CEC standards.

F. The module manufacturer shall have been in business for more than 20 years with modules operating in the field for more than 20 years.

2.03 SUPPORT SYSTEM:

A. PV panels are to be mounted on the roof.

B. Roof support system shall be as manufactured by Unirac or approved equal. Contractor shall submit the design of the support system and structural calculations to the project/building Structural Engineer of Record (SEOR) for review. Contractor shall make revisions to the support system as required by the SEOR.

C. Contractor shall coordinate the placement and attachment of the support system with the general contractor and the roof contractor.

2.04 METERING, MONITORING SYSTEM:

A. A data acquisition system (DAS) shall be provided as part of the PV system. The DAS shall include instrumentation that allows the measurement of

1. Ambient temperature.
2. PV module temperature.
3. Wind speed.
4. Plane of array solar irradiation.
5. DC system voltage.
6. DC system current.
7. AC system power output.
8. Overall facility energy use in 15 minute increments whether the energy is from solar or the utility – in essence a utility company “shadow” meter.

B. The DAS shall include a data-logger, network interface device for data retrieval, Nema 4 enclosure, dry bulb temperature measuring device with radiation shield, anemometer, and solar sensor.

C. The DAS shall be certified by the California Solar Initiative and shall be listed on the Go solar California website.

D. The data acquisition system shall include 5-years of monitoring and hosting service on a secure website – per the minimum requirements of the California Solar Initiative.

E. Meters shall be provided and installed per the California Solar Initiative program and shall provide revenue grade interval data recording (IDR) meter complete with industry standard telemetry for communication with ethernet services. The contractor shall also provide a connection to the building’s energy management system (EMS) for the purpose of metering, monitoring and data collection of solar production. Meters must connect to a monitoring/data collection recording solar production through Time of Use (TOU) increments applicable to the local utility standards, with a minimum 15 minute intervals.

F. System shall include the DAS and weather station.

PART 3 - EXECUTION

3.01 Coordinate the placement and attachment of the PV modules to the support system with the support system installer.

3.02 Coordinate the placement and attachment of the solar support system to the roof with the general contractor and the roof contractor.

3.03 Coordinate the location of the DAS in the Telecom Room 114 to ensure required clearances are maintained. Route required communications conduit and wire between the DAS and the MDF and between the DAS and the inverter.

3.04 Coordinate the location of the weather station to ensure optimum performance.

3.05 Replace damaged PV modules and modules that are not performing to the manufacturer’s specifications with new modules.

3.06 Test inverter for compliance with the manufacturer’s specifications. Replace damaged or non-performing inverter with new inverter.

3.07 Clean all module and inverter surfaces at completion of the project.

3.08 Refer to Architectural roof plan for the solar ready areas and Electrical plans for preferred PV system equipment locations.

3.09 Coordinate routing of PV conduit, equipment locations and connections to the facility power distribution system with the General Contractor and Electrical Contractor prior to rough-in.

END OF SECTION

SECTION 26 32 13 GENERATOR

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section includes packaged diesel engine generators for emergency use with the following features:
   1. Diesel engine.
   2. Alternator.
   3. Unit-mounted radiator.
   4. Diesel fuel-oil system.
   5. Control and monitoring.
   6. Generator overcurrent and fault protection.
   7. Generator, exciter, and voltage regulator.
   8. Outdoor engine generator enclosure.
   9. Vibration isolation devices.
   10. Finishes.

B. Related Requirements:
   1. Section 263600 "Transfer Switches" for transfer switches, including sensors and relays to initiate automatic-starting and -stopping signals for engine generators.

1.3 DEFINITIONS

A. AREP: Auxiliary winding regulation excitation principle. Voltage support for the AVR comes from independent auxiliary windings located in the main stator.

B. AVR: Automatic voltage regulator.

C. EPS: Emergency power supply.

D. EPSS: Emergency power supply system.

E. Operational Bandwidth: The total variation, from the lowest to highest value of a parameter over the range of conditions indicated, expressed as a percentage of the nominal value of the parameter.

F. PMG: Permanent magnet generator. Voltage support for the AVR comes from an independent auxiliary permanent magnet generator which is mounted on the shaft extension of the alternator.

1.4 ACTION SUBMITTALS

A. Product Data: For each type of product.

1. Include rated capacities, operating characteristics, electrical characteristics, and furnished specialties and accessories.
2. Include thermal damage curve for generator.
3. Include time-current characteristic curves for generator protective device.
4. Include fuel consumption in gallons per hour at 0.8 power factor at 0.5, 0.75, and 1.0 times generator capacity.
5. Include airflow requirements for cooling and combustion air in cubic feet per minute at 0.8 power factor, and reference air-supply temperature. Provide Drawings indicating requirements and limitations for location of air intake and exhausts.
6. Include generator characteristics, including, but not limited to, kilowatt rating, efficiency, reactances, and short-circuit current capability.

B. Shop Drawings:
1. Include plans and elevations for engine generator and other components specified. Indicate access requirements affected by height of subbase fuel tank.
2. Include details of equipment assemblies. Indicate dimensions, weights, loads, required clearances, method of field assembly, components, and location and size of each field connection.
3. Identify fluid drain ports and clearance requirements for proper fluid drain.
4. Design calculations for selecting vibration isolators and seismic restraints and for designing vibration isolation bases.
5. Vibration Isolation Base Details: Detail fabrication, including anchorages and attachments to structure and supported equipment. Include base weights.
6. Include diagrams for power, signal, and control wiring. Complete schematic, wiring, and interconnection diagrams showing terminal markings for EPS equipment and functional relationship between all electrical components.

1.5 INFORMATIONAL SUBMITTALS

A. Seismic Qualification Data: Certificates for engine generator, accessories, and components, from manufacturer.
1. Component Importance Factor: 1.5
2. IBC pre-approved

B. Source Quality-Control Reports: Including, but not limited to, the following:
1. Certified summary of prototype-unit test report.
2. Certified Test Reports: For components and accessories that are equivalent, but not identical, to those tested on prototype unit.
3. Certified Summary of Performance Tests: Certify compliance with specified requirement to meet performance criteria for sensitive loads.
4. Report of factory test on units to be shipped for this Project, showing evidence of compliance with specified requirements.
5. Report of sound generation at octave bands in accordance with ISO 8528-10.
6. Report of exhaust emissions showing compliance with applicable regulations.
7. Certified Torsional Vibration Compatibility: Comply with NFPA 110.

1.6 CLOSEOUT SUBMITTALS

A. Operation and Maintenance Data: For engine generators to include in emergency, operation, and maintenance manuals.
1. In addition to items specified in Section 017823 "Operation and Maintenance Data," include the following:

a. List of tools and replacement items recommended to be stored at Project for ready access. Include part and drawing numbers, current unit prices, and source of supply.
b. Operating instructions mounted adjacent to generator location.
c. Training plan.

1.7 QUALITY ASSURANCE

A. Installer Qualifications: An authorized representative who is trained and approved by the manufacturer.

1.8 WARRANTY

A. Comprehensive Manufacturer's Warranty: Manufacturer agrees to repair or replace components of packaged engine generators and associated auxiliary components that fail in materials or workmanship within specified warranty period.
1. Warranty Period: Five years or 3000 hours from date of generator commissioning.

1.9 PERMITS

A. The contractor shall be responsible for obtaining all permits, file applications and pay for all fees required for the following:

1. San Diego County Air Pollution Control District (San Diego APCD) permit to construct.
2. San Diego APCD permit to operate.
3. San Diego APCD health risk screening analysis.
4. Planning Department environmental permit (air and noise).
5. Fire Marshal hazardous materials permit.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Basis-of-Design Product: Subject to compliance with requirements, provide MTU Onsite Energy Corporation; 6R0150 DS250:
1. MTU Onsite Energy Corporation.
Contact: Collicutt Energy Services at (310) 245-0292 or Tony.Miccolis@Collicutt.com

B. Source Limitations:
1. Obtain packaged engine generators and engines from a single manufacturer.
2. Obtain packaged engine generators and auxiliary components from a single manufacturer.

2.2 PERFORMANCE REQUIREMENTS

A. Seismic Performance: Engine generator housing, subbase fuel tank, engine generator, batteries, battery racks, silencers, sound attenuating equipment, accessories, and components shall withstand the effects of earthquake motions determined according to ASCE/SEI 7-10

1. The term "withstand" means "the unit will remain in place without separation of any parts when subjected to the seismic forces specified and the unit will be fully operational after the seismic event."
2. Shake-table testing shall comply with ICC-ES AC156. Testing shall be performed with all fluids at worst-case normal levels.
3. Component Importance Factor: 1.5.
4. IBC pre-approved

B. NFPA Compliance:
1. Comply with NFPA 37.
2. Comply with NFPA 70.
3. Comply with NFPA 99.
4. Comply with NFPA 110 requirements for Level 1 EPSS.

C. UL Compliance: Comply with UL 2200.

D. Engine Exhaust Emissions: Comply with EPA NSPS requirements for emergency generators and applicable state and local government requirements.

E. Noise Emission: Comply with applicable state and local government requirements for maximum noise level at property line due to sound emitted by engine generator, including engine, engine exhaust, engine cooling-air intake and discharge, and other components of installation. Comply with ISO 8528-10 for sound measurements at 23.0 feet(7 m).

F. Environmental Conditions: Engine generator system shall withstand the following environmental conditions without mechanical or electrical damage or degradation of performance capability:
1. Ambient Temperature: 122 deg F(50 deg C).
2. Relative Humidity: Zero to 100 percent.
3. Altitude: Sea level to 272 feet(83m)

2.3 ENGINE GENERATOR ASSEMBLY DESCRIPTION

A. Factory assembled and tested, water-cooled engine, with brushless generator and accessories.

B. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.

C. EPSS Class: Engine generator shall be classified as a Class 96 according to NFPA 110.

D. Generator Set Rating: 250 kW.

E. Power Factor: 0.8 lagging.

F. Frequency: 60 Hz

G. Voltage: 208 -V ac.

H. Phase: Three-phase, four-wire wye.

I. Governor: Adjustable isochronous, with speed sensing.

J. Mounting Frame: Structural steel framework to maintain alignment of mounted components without depending on concrete foundation. Provide lifting attachments sized and spaced to prevent deflection of base during lifting and moving.

1. Rigging Diagram: Inscribed on metal plate permanently attached to mounting frame to indicate location and lifting capacity of each lifting attachment and engine generator center of gravity.

K. Capacities and Characteristics:
1. Power Output Ratings: Nominal ratings as indicated at 0.8 power factor excluding power required for the continued and repeated operation of the unit and auxiliaries.
2. Nameplates: For each major system component to identify manufacturer's name, model, and serial number, of component.

L. Engine Generator Performance:
1. Steady-State Voltage Operational Bandwidth: 0.25 percent of rated output voltage, from no load to full load, and one-percent for non-PMG alternators.
2. Load Factor: 85-percent load factor according to ISO 8528-1.
   a. If below, supplier shall provide updated documents for performance modified to 85-percent load factor in regards to time before overhaul (TBO) and the respective maintenance schedule.
3. When facility loads are provided, a generator set sizing report from the manufacturer shall be provided, detailing each load, and the performance for each step.
4. Transient Voltage Performance: Not more than 20 percent variation for 50 percent step-load increase or decrease. Voltage shall recover and remain within the steady-state operating band within 3.5-seconds.
5. Steady-State Frequency Operational Bandwidth: 0.25 percent of rated frequency, from no load to full load, and 0.5 percent for mechanical governed engines.
6. Steady-State Frequency Stability: When system is operating at any constant load within the rated load, there shall be no random speed variations outside the steady-state operational band and no hunting or surging of speed.
7. Transient Frequency Performance: Less than 5 percent variation for 50 percent step-load increase or decrease. Frequency shall recover and remain within the steady-state operating band within five seconds.
8. Output Waveform: At no load, harmonic content measured line to line or line to neutral shall not exceed 5 percent total and 3 percent for single harmonics. Telephone influence factor, determined according to NEMA MG 1, shall not exceed 50 percent.
9. Sustained Short-Circuit Current: For a three-phase, bolted short circuit at system output terminals, system shall supply a minimum of 300 percent of rated full-load current for not less than 10 seconds and then clear the fault automatically with PMG/AREP, without damage to generator system components.
10. Unit shall be capable of accepting 100 percent load step in one step per NFPA 110 requirements.
11. Start Time: Comply with NFPA 110, Type 10, system requirements.

2.4 DIESEL ENGINE

A. Rated Engine Speed: 1800 rpm.

B. Lubrication System: Engine or skid mounted.
1. Filter and Strainer: Select according to engine manufacturer's requirements for particle removal.
2. Thermostatic Control Valve: Control flow in system to maintain optimum oil temperature. Unit shall be capable of full flow and is designed to be fail-safe.
3. Crankcase Drain: Arranged for complete gravity drainage to an easily removable container with no disassembly and without use of pumps, siphons, special tools, or appliances.

C. Jacket Coolant Heater: Electric-immersion type, factory installed in coolant jacket system. Comply with NFPA 110 requirements for Level 1 equipment for heater capacity and with UL 499.

D. Cooling System: Closed loop, liquid cooled, with radiator factory mounted on engine generator mounting frame and integral engine-driven coolant pump.
   1. Coolant: Glycol-based antifreeze and water mixture for freeze protection to minus 20 deg F(minus 29 deg C), with anticorrosion additives as recommended by engine manufacturer.
   2. Size of Radiator: Adequate to contain expansion of total system coolant, from cold start to 100 percent load condition.
   3. Expansion Tank: Rated to withstand maximum closed-loop coolant-system pressure for engine used. Equip with gage glass and petcock. Replace gage glass with a pressure sensor when gage glass is located more than 8 feet(2.4 m) from the floor.
   4. Temperature Control: Self-contained, thermostatic-control valve modulates coolant flow automatically to maintain optimum constant coolant temperature as recommended by engine manufacturer.
   5. Coolant Hose: Flexible assembly with inside surface of nonporous rubber and outer covering of aging-, UV-, and abrasion-resistant fabric.

      a. Rating: 50-psig(345-kPa) maximum working pressure with coolant at 180 deg F(82 deg C), and noncollapsible under vacuum.
      b. End Fittings: Flanges or steel pipe nipples with clamps to suit piping and equipment connections.

E. Muffler/Silencer: Designed to meet sound attenuation levels as specified herein.

F. Air-Intake Filter: Single-stage, engine-mounted air cleaner with replaceable dry-filter element and "blocked filter" indicator.

G. Starting System: Match engine ECU and genset control voltage requirements.
   1. Components: Sized so they are not damaged during a full engine-cranking cycle, with ambient temperature at maximum specified in "Performance Requirements" Article.
   2. Cranking Motor: Heavy-duty unit that automatically engages and releases from engine flywheel without binding.
   3. Cranking Cycle: As required by NFPA 110 for system level specified.
   4. Battery: Lead acid, with capacity within ambient temperature range specified in "Performance Requirements" Article to provide NFPA 110 specified cranking cycle without recharging.
   5. Battery Cable: Size as recommended by engine manufacturer for cable length indicated. Include required interconnecting conductors and connection accessories.
   6. Battery Compartment: Factory fabricated of metal with acid-resistant finish and thermal insulation. Include accessories required to support and fasten batteries in place.

      a. Compartment Heater: Thermostatically controlled heater shall be arranged to maintain battery above 50 deg F(10 deg C) regardless of external ambient temperature within range specified in "Performance Requirements" Article.
      b. Compartment Ventilation: Provide ventilation to exhaust battery gases.
   7. Battery Stand: Factory-fabricated, two-tier metal with acid-resistant finish designed to hold the quantity of battery cells required and to maintain the arrangement to minimize lengths of battery interconnections.
   8. Battery-Charging Alternator: Factory mounted on engine with solid-state voltage regulation.
   9. Battery Charger: Current-limiting, automatic-equalizing, and float-charging type designed for lead-acid batteries. Unit shall comply with UL 1236 and include the following features:

a. Operation: Equalizing-charging rate of 10 A shall be initiated automatically after battery has lost charge until an adjustable equalizing voltage is achieved at battery terminals. Unit shall then be automatically switched to a lower float-charging mode and shall continue to operate in that mode until battery is discharged again.
b. Automatic Temperature Compensation: Adjust float and equalize voltages for variations in ambient temperature from minus 40 deg F(minus 40 deg C) to 140 deg F(plus 60 deg C) to prevent overcharging at high temperatures and undercharging at low temperatures.
   1) Temperature Probe: Equip battery charger with a temperature probe on the negative cable when battery heaters are used.

c. Automatic Voltage Regulation: Maintain constant output voltage regardless of input voltage variations up to plus or minus 10 percent.
d. Ammeter and Voltmeter: Flush mounted in door. Meters shall indicate charging rates.
e. Safety Functions: Sense abnormally low battery voltage and close contacts providing low battery voltage indication on control and monitoring panel. Sense high battery voltage and loss of ac input or dc output of battery charger. Either condition shall close contacts that provide a battery-charger malfunction indication at system control and monitoring panel.
f. Enclosure and Mounting: NEMA 250, Type 1 wall-mounted cabinet.

2.5 DIESEL FUEL-OIL SYSTEM:

A. Main Fuel Pump: Mounted on engine to provide primary fuel flow under starting and load conditions.

B. Fuel Filtering: Remove water and contaminants larger than 5 microns, or as recommended by the engine manufacturer.

C. Relief-Bypass Valve: Automatically regulates pressure in fuel line and returns excess fuel to source.

D. Subbase-Mounted, Double Wall, Fuel Oil Tank: Factory installed and piped, complying with UL 142 Fuel Oil Tank.

1. Tank level indicator.

2. Fuel-Tanks Capacity: 48-hour capacity at 100% full load

3. Leak detection in interstitial space.

4. Vandal-resistant fill cap.

5. Containment Provisions: Comply with requirements of authorities having jurisdiction.

6. California Spill Package, to include the following:
   a. 5 Gallon Spill Box
   b. OFPV with Scully Fitting Cap
   c. Alarm Panel
   d. High / Low Fuel Level Switch
   e. Normal, Primary and Secondary Relief Vents: 12’ Vent with Extension
   f. Fuel Leak Switch
   g. Emergency Vent.

2.6 OUTDOOR ENGINE GENERATOR ENCLOSURE; Level 3 Enclosure, 73 dBA at 23ft

A. Description: Vandal-resistant, sound-attenuating, weatherproof steel housing, wind resistant up to 130 mph (209 km/h). Multiple panels shall be lockable and provide adequate access to components requiring maintenance. Instruments and control shall be mounted within enclosure.

B. Description: Prefabricated or pre-engineered, galvanized-steel-clad, integral structural-steel-framed, skin-tight enclosure, erected on concrete foundation.

C. Seismic Design: Comply with State of California seismic requirements.

D. Hinged Doors: Manufacturer's standard construction with padlocking provisions.

E. Thermal Insulation: Manufacturer's standard materials and thickness selected in coordination with space heater to maintain winter interior temperature within operating limits required by engine generator components.

F. This generator will require Rypos Active Diesel Particulate Filter (DPF). No exceptions.

G. Engine-Cooling Airflow through Enclosure: Maintain temperature rise of system components within required limits when unit operates at 100 percent of rated load for two hours with ambient temperature at top of range specified in system service conditions.
   1. Louvers: Fixed-engine, cooling-air inlet and discharge. Storm-proof, drainable, fixed, louvers to prevent entry of rain and snow.
   2. Ventilation: Provide temperature-controlled exhaust fan interlocked to prevent operation when engine is running.

H. Interior Lights with Switch: Factory-wired, vapor-proof luminaires within housing; arranged to illuminate controls and accessible interior. Arrange for external electrical connection.
   1. DC lighting system for operation when remote source and generator are both unavailable.

I. Sound Attenuation: When measured at 23.0 feet(7 m) from sides of unit, attenuation shall be 73 dBA or less. Octave band sound report shall be provided based on similar unit construction.

2.7 CONTROL AND MONITORING

A. Provide minimum run time control set for 15 minutes, with override only by operation of a remote emergency-stop switch.

B. Comply with UL 2200 for stationary engine generator assemblies.

C. Configuration: Operating and safety indications, protective devices, basic system controls, and engine gages shall be grouped in a common control and monitoring panel mounted on the engine generator. Mounting method shall isolate the control panel from engine generator vibration. Panel shall be powered from the engine generator battery.

D. Control and Monitoring Panel:
   1. Digital controller with integrated LCD display, controls, and microprocessor, capable of local and remote control, monitoring, and programming, with battery backup.

      a. MGC2020 controller with PLC logic incorporating drag and drop ladder logic available for the owner/user. Logic shall be designed such that all parameters

within the generator set controller can be used in addition to additional inputs and outputs.

2. Instruments: Located on the control and monitoring panel and viewable during operation.

    a. Engine lubricating-oil pressure gage.
    b. Engine-coolant temperature gage.
    c. DC voltmeter (alternator battery charging).
    d. Running-time meter.
    e. AC voltmeter, for each phase.
    f. AC ammeter, for each phase.
    g. AC frequency meter.
    h. Digital generator-voltage-adjusting feature to allow plus or minus 5 percent adjustment.

3. Controls and Protective Devices: Controls, shutdown devices, and common visual alarm and pre-alarm indication as required by NFPA 110 for Level 1 system, including the following:

    a. Run-Off-Auto switch.
    b. Control switch not in automatic position alarm.
    c. Overcrank shutdown device.
    d. Low water temperature alarm.
    e. Overspeed shutdown device.
    f. Low-fuel alarm
    g. Coolant low-level alarm.
    h. Coolant high-temperature prealarm.
    i. Coolant high-temperature alarm.
    j. Coolant high-temperature shutdown device.
    k. EPS under load indicator.
    l. Battery high-voltage alarm.
    m. Low-cranking voltage alarm.
    n. Battery-charger malfunction alarm.
    o. Battery low-voltage alarm.
    p. Lamp test.
    q. Contacts for local and remote common alarm.
    r. Remote manual-stop shutdown device.
    s. Generator overcurrent-protective-device not-closed alarm.
    t. Generator over and under voltage

E. Common Remote Panel with Common Audible Alarm: Comply with NFPA 110 requirements for Level 1 systems. Include necessary contacts and terminals in control and monitoring panel. Remote panel shall be powered from the engine generator battery.

F. Remote Display Panel: Comply with NFPA 99. An LED indicator light labeled with proper alarm conditions shall identify each alarm event, and a common audible signal shall sound for each alarm condition. Silencing switch in face of panel shall silence signal without altering visual indication. Connect so that after an alarm is silenced, clearing of initiating condition will reactivate alarm until silencing switch is reset. Cabinet and faceplate are surface- or flush-mounting type to suit mounting conditions indicated.

1. Overcrank alarm.
2. Coolant low-temperature alarm.
3. High engine temperature prealarm.
4. High engine temperature alarm.
5. Low lube oil pressure alarm.
6. Overspeed alarm.
7. Low-fuel main tank alarm.
8. Low coolant level alarm.

9. Low-cranking voltage alarm.
10. Contacts for local and remote common alarm.
11. Audible-alarm silencing switch.
12. Run-Off-Auto switch.
13. Control switch not in automatic position alarm.
14. Fuel tank derangement alarm.
15. Fuel tank high-level shutdown of fuel-supply alarm.
16. Lamp test.
17. Low-cranking voltage alarm.
18. Generator overcurrent protective device not closed.

G. Remote Emergency-Stop Switch: Flush; wall mounted, unless otherwise indicated; and labeled. Push button shall be protected from accidental operation.

2.8 GENERATOR OVERCURRENT AND FAULT PROTECTION

A. Overcurrent protective devices for the entire EPSS shall be coordinated to optimize selective tripping when a short circuit occurs. Coordination of protective devices shall consider both utility and EPSS as the voltage source.
   1. Overcurrent protective devices for the EPSS shall be accessible only to authorized personnel.

B. Generator Circuit Breaker: Molded-case, thermal-magnetic type; 100 percent rated; complying with UL 489. Quantity (1) 1,000 amp frame**, adjustable trip circuit breaker, set circuit breaker to trip at 800A**, (1) 20A, 100% Rated Breaker For Rypos Active DPF.
   1. Tripping Characteristic: Designed specifically for generator protection.
   2. Trip Rating: Matched to generator output rating.
   3. Mounting: Adjacent to or integrated with control and monitoring panel.
   4. Coordination: Shall coordinate with the downstream circuit breaker in compliance with CEC Article 700.32.

C. Generator Protector: Microprocessor-based unit shall continuously monitor current level in each phase of generator output, integrate generator heating effect over time, and predict when thermal damage of alternator will occur. When signaled by generator protector or other engine generator protective devices, a shunt-trip device in the generator disconnect switch shall open the switch to disconnect the generator from load circuits. Protector performs the following functions:
   1. Initiates a generator overload alarm when generator has operated at an overload equivalent to 110 percent of full-rated load for 60 seconds. Indication for this alarm is integrated with other engine generator malfunction alarms. Contacts shall be available for load shed functions.
   2. Under single- or three-phase fault conditions, regulates generator to 300 percent of rated full-load current for up to 10 seconds.
   3. As overcurrent heating effect on the generator approaches the thermal damage point of the unit, protector switches the excitation system off, opens the generator disconnect device, and shuts down the engine generator.
   4. Senses clearing of a fault by other overcurrent devices and controls recovery of rated voltage to avoid overshoot.

2.9 DIESEL PARTICULATE FILTER (DPF)

A. Acceptable Manufacturers include Rypos Inc model RH306-M and must meet the qualifications of a United States based supplier for both Confidential and Governmental clearances.

B. The DPF should be sized based on the engine data provided to achieve at least the levels equivalent to, CARB verification to level III+ for emissions reduction.

C. DPF shall incorporate Active regeneration in that it burns off the soot particles without a minimum exhaust temperature or engine minimum load or runtime requirements. It shall regenerate at low engine loads including under idling conditions.

D. Active DPF(s) shall be a minimum of 80% porous, and shall regenerate when energized electrically, independent of exhaust temperatures.

E. Active DPF(s) shall include differential pressure sensors to initiate and control regeneration process as a function of backpressure. Backpressure must not exceed 90% of the engine manufacturer's specification.

F. Active DPF(s) shall receive power from the Genset and the nominal power draw should not exceed 2% of the generator's rated power.

G. Passive Regeneration through use of the following methods is not acceptable:
   a. An indirect heating source such as an electric heater that reduces the load capacity of the generator and requires increased run time and fuel consumption.
   b. An integrated load bank that results in increased run times and fuel costs.
   c. A separate combustion source used to increase the exhaust temperature such as a duct burner.

H. The Active DPF(s) shall meet the following minimum requirements:
   a. PM Reduction: 85%
   b. Hydrocarbon reduction: 75%
   c. Carbon Monoxide reduction: 70%
   d. Nitrogen Dioxide reduction (NO2):40%

I. The Active DPF shall
   a. be suitable for horizontal mounting , with flanged inlets and outlets.
   b. be coupled to engine exhaust outlets by means of an adequately sized section of corrugated flex. Flex connectors shall be flanged at both ends for mating to the engine and exhaust system.
   c. act as a Critical Grade silencer.
   d. have a 304 stainless steel enclosure.

J. The Active DPF(s) shall give operators visual notification and contact closure when:
   a. Operating normally.
   b. Backpressure exceeds normal operating conditions.

K. The DPF shall be able to operate effectively within the engine manufacturer's recommended operating profile, while operating within the acceptable backpressure range as specified by engine manufacturer; without limiting variation in engine loading levels and/or number of cold starts beyond specification by the engine manufacturer.

L. Install Rypos DPF on the roof of enclosure and wired to 20A breaker noted in section 2.8.B.

2.10 GENERATOR, EXCITER, AND VOLTAGE REGULATOR

A. Comply with NEMA MG 1.

B. Drive: Generator shaft shall be directly connected to engine shaft. Exciter shall be rotated integrally with generator rotor.

C. Electrical Insulation: Class H or Class F.

D. Stator-Winding Leads: Brought out to terminal box to permit future reconnection for other voltages if required.

E. Range: Provide limited range of output voltage by adjusting the excitation level.

F. Construction shall prevent mechanical, electrical, and thermal damage due to vibration, overspeed up to 125 percent of rating, and heat during operation at 110 percent of rated capacity.

G. Enclosure: Dripproof.
   1. Ingress Protection Rating (IP): Follow IEC 60529 and IP23.

H. Instrument Transformers: Mounted within generator enclosure.

I. Voltage Regulator: Solid-state type, separate from exciter, providing performance as specified and as required by NFPA 110.
   1. Digital Adjustment on Control and Monitoring Panel: Provide plus or minus 5 percent adjustment of output-voltage operating band.

J. Windings: Two-thirds pitch stator winding and fully linked amortisseur winding.

2.11 VIBRATION ISOLATION DEVICES

A. As recommended by the manufacturer to meet the following site requirements:
   1. Maximum Vibration Transmission: 30 mm/s.
   2. Based on ISO 8528-9 for vibration.

B. Vibration isolation devices shall not be used to accommodate misalignments or to make bends.

2.12 FINISHES

A. Outdoor Enclosures and Components: Powder-coated finish over steel enclosure.
   1. Components: Liquid paint.

2.13 SOURCE QUALITY CONTROL

A. Prototype Testing: Factory test engine generator using same engine model, constructed of identical or equivalent components and equipped with identical or equivalent accessories.
   1. Tests: Comply with NFPA 110, Level 1 Energy Converters and with IEEE 115.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine areas, equipment bases, and conditions, with Installer present, for compliance with requirements for installation and other conditions affecting packaged engine generator performance.

B. Examine roughing-in for piping systems and electrical connections. Verify actual locations of connections before packaged engine generator installation.

C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

A. Interruption of Existing Electrical Service: Do not interrupt electrical service to facilities occupied by Owner or others unless permitted under the following conditions and then only after arranging to provide temporary electrical service according to requirements indicated:
   1. Notify Construction Manager/Owner no fewer than **seven (7)** days in advance of proposed interruption of electrical service.

3.3 FIELD QUALITY CONTROL

A. Testing Agency: Owner will engage a qualified testing agency to perform tests and inspections.

B. Testing Agency: Contractor will engage a qualified testing agency to perform tests and inspections.

C. Manufacturer's Field Service: Engage a factory-authorized service representative to test and inspect components, assemblies, and equipment installations, including connections.

D. Perform tests and inspections with the assistance of a factory-authorized service representative.

E. Tests and Inspections:
   1. Perform tests recommended by manufacturer and in "Visual and Mechanical Inspection" and "Electrical and Mechanical Tests" subparagraphs below, as specified in the NETA ATS. Certify compliance with test parameters.
   2. NFPA 110 Acceptance Tests: Perform tests required by NFPA 110 that are additional to those specified here, including, but not limited to, single-step full-load pickup test.
   3. Battery Tests: Equalize charging of battery cells according to manufacturer's written instructions. Record individual cell voltages.
      a. Measure charging voltage and voltages between available battery terminals for full-charging and float-charging conditions. Check electrolyte level and specific gravity under both conditions.
      b. Test for contact integrity of all connectors. Perform an integrity load test and a capacity load test for the battery.
      c. Verify acceptance of charge for each element of the battery after discharge.
      d. Verify that measurements are within manufacturer's specifications.
   4. Battery-Charger Tests: Verify specified rates of charge for both equalizing and float-charging conditions.

5. System Integrity Tests: Methodically verify proper installation, connection, and integrity of each element of engine generator system before and during system operation. Check for air, exhaust, and fluid leaks.
6. Exhaust-System Back-Pressure Test: Use a manometer with a scale exceeding 40-inch wg(120 kPa). Connect to exhaust line close to engine exhaust manifold. Verify that back pressure at full-rated load is within manufacturer's written allowable limits for the engine.
7. Exhaust Emissions Test: Comply with applicable government test criteria.
8. Voltage and Frequency Transient Stability Tests: Use recording oscilloscope to measure voltage and frequency transients for 50 and 100 percent step-load increases and decreases, and verify that performance is as specified.
9. Harmonic-Content Tests: Measure harmonic content of output voltage at 25 percent and 100 percent of rated linear load. Verify that harmonic content is within specified limits.

F. Coordinate tests with tests for transfer switches, and run them concurrently.

G. Test instruments shall have been calibrated within the past 12 months, traceable to NIST Calibration Services, and adequate for making positive observation of test results. Make calibration records available for examination on request.

H. Leak Test: After installation, charge exhaust, coolant, and fuel systems and test for leaks. Repair leaks and retest until no leaks exist.

I. Operational Test: After electrical circuitry has been energized, start units to confirm proper motor rotation and unit operation for generator and associated equipment.

3.4 DEMONSTRATION

A. Engage a factory-authorized service representative to train Owner's maintenance personnel to adjust, operate, and maintain packaged engine generators.

3.5 MAINTENANCE CONTRACT

A. Generator supplier to provide a one-year maintenance contract, two times per year with load bank testing. On the 6th month following start-up, a visual inspection will be conducted along with topping off fluids (coolant & oil) Diesel fuel not included. On the 12th month following start up, a visual inspection will be conducted along with an oil and filter change with a 2-hour load bank test. (Load bank test report will be provided to the end user)

END OF SECTION

PART 1 - GENERAL

1.1 SCOPE

Furnish and install automatic transfer switches (3ATS) with number of poles, amperage, voltage, and withstand current ratings as shown on the plans. (ASCO Catalog No. H03ATSA301000CGXF (11BE,18RX,31Z) Each automatic transfer shall consist of a mechanically held power transfer switch unit and a microprocessor controller, interconnected to provide complete automatic operation. All transfer switches and control panels shall be the product of the same manufacturer.

1.2 ACCEPTABLE MANUFACTURERS

Automatic transfer switches shall be ASCO Series 300 (3ATS). Any alternate shall be submitted to the consulting engineer in writing at least 10 days prior to bid. Each alternate bid must list any deviations from this specification.

1.3 CODES AND STANDARDS

A. UL 1008 - Standard for Automatic Transfer Switches.
B. CSA C22.2 No.178 – 1978
C. NFPA 70 - National Electrical Code
D. NFPA 99 – Health Care Facilities
E. NFPA 110 - Emergency and Standby Power Systems
F. IEEE Standard 446 - IEEE Recommended Practice for Emergency and Standby Power Systems for Commercial and Industrial Applications
G. NEMA Standard ICS10-2005 (formerly ICS2-447) - AC Automatic Transfer Switches
H. NEC Articles 700, 701, 702
I. International Standards Organization ISO 9001: 2008
J. IEC 60947 – 6 – 1

PART 2 - PRODUCTS

2.1 MECHANICALLY HELD TRANSFER SWITCH

A. The transfer switch unit shall be electrically operated and mechanically held. The electrical operator shall be a single-solenoid mechanism, momentarily energized. Main operators which include over current disconnect devices will not be accepted. The switch shall be mechanically interlocked to ensure only one of two possible positions, normal or emergency.

B. The switch shall be positively locked and unaffected by momentary outages so that contact pressure is maintained at a constant value and temperature rise at the contacts is minimized for maximum reliability and operating life.

C. All main contacts shall be silver composition. Switches rated 800 amperes and above shall have segmented blow-on construction for high withstand current capability and be protected by separate arcing contacts.

D. Inspection of all contacts shall be possible from the front of the switch without disassembly of operating linkages and without disconnection of power conductors. A manual operating handle shall be provided for maintenance purposes. The handle shall permit the operator to manually

stop the contacts at any point throughout their entire travel to inspect and service the contacts when required.

E. Designs utilizing components of molded-case circuit breakers, contactors, or parts thereof which are not intended for continuous duty, repetitive switching or transfer between two active power sources are not acceptable.

F. Where neutral conductors must be switched, the ATS shall be provided with fully- rated neutral transfer contacts.

G. Where neutral conductors are to be solidly connected, a neutral terminal plate with fully-rated AL-CU pressure connectors shall be provided.

2.2 GROUP 'G' CONTROLLER WITH INTEGRATED USER INTERFACE PANEL

A. The controller shall be connected to the transfer switch by an interconnecting wiring harness. The harness shall include a keyed disconnect plug to enable the controller to be disconnected from the transfer switch for routine maintenance.

B. The controller shall direct the operation of the transfer switch. The controller's sensing and logic shall be controlled by a built-in microprocessor for maximum reliability, minimum maintenance, inherent serial communications capability, and the ability to communicate via the Ethernet through optional communications module.

C. A single controller shall provide single and three phase capability for maximum application flexibility and minimal spare part requirements. Voltage sensing shall be true RMS type and shall be accurate to ± 1% of nominal voltage. Frequency sensing shall be accurate to ± 0.1Hz. Time delay settings shall be accurate to ±0.5% of the full scale value of the time delay. The panel shall be capable of operating over a temperature range of -20 to + 70 degrees C, and storage from -55 to + 85 degrees C.

D. The controller shall be enclosed with a protective cover and be mounted separate from the transfer switch unit for safety and ease of maintenance. Sensing and control logic shall be provided on printed circuit boards.

E. The controller shall meet or exceed the requirements for Electromagnetic Compatibility (EMC) as follows:

1. IEC 60947 – 6 – 1 Multiple Function Equipment Transfer Switching Equipment. 61000-4 Testing And Measurement Techniques – Overview.
   a. IEC 61000 – 4 - 2 Electrostatic Discharge Immunity
   b. IEC 61000 – 4 - 3 Radiated RF Field Immunity
   c. IEC 61000 – 4 - 4 Electrical Fast Transient/Burst Immunity.
   d. IEC 61000 – 4 - 5 Surge Immunity
   e. IEC 61000 – 4 – 6 Conducted RF Immunity
2. CISPR 11 – Conducted RF Emissions and Radiated RF Emissions

2.3 ENCLOSURE

A. The 3ATS shall be provided with a Nema 1 enclosure suitable for floor mounting.

2.4 CONTROLLER DISPLAY AND KEYPAD

A. A 128*64 graphical LCD display and keypad shall be an integral part of the controller for viewing all available data and setting desired operational parameters. Operational parameters shall also be available for viewing and limited control through communications port. The following parameters shall only be adjustable via DIP switches on the controller.

1. Nominal line voltage and frequency

2. Single or three phase sensing on normal

3. Transfer operating mode configuration, (open transition)

All instructions and controller settings shall be easily accessible, readable and accomplished without the use of codes, calculations, or instruction manuals.

B. Voltage and Frequency Sensing

1. Voltage and frequency on both the normal and emergency sources (as noted below) shall be continuously monitored, with the following pickup ,dropout, and trip settings capabilities (values shown as % of nominal unless otherwise specified.

Parameter	Sources	Dropout/Trip	Pickup/Reset
Undervoltage	N & E	70 to 98%	85 to 100%
Overvoltage	N & E	102 to116%	2% below trip
Underfrequency	N & E	85 to 98%	86 to 100%
Overfrequency	N & E	101 to 111%	2% below trip

2. Repetitive accuracy of all settings shall be within 1% at +25C

3. Voltage and frequency settings shall be field adjustable in 1% increments either locally with the display and keypad or remotely via serial communications port access.

4. Source status screens shall be provided for both normal & emergency to provide digital readout of voltage and frequency. *Note: Single phase sensing on emergency.*

5. The backlit 128*64 graphical display shall have multiple language capability. Languages can be selected from the user interface.

C. Time Delays

1. A time delay shall be provided to override momentary normal source outages and delay all transfer and engine starting signals, adjustable 0 to 6 seconds. It shall be possible to bypass the time delay from the controller user interface.

2. A time delay shall be provided on transfer to emergency, adjustable from 0 to 60 minutes 59 seconds for controlled timing of transfer of loads to emergency. It shall be possible to by-pass the time delay from the controller user interface.

3. A generator stabilization time delay shall be provided after transfer to emergency adjustable 0 or 4 seconds.

4. A time delay shall be provided on retransfer to normal, adjustable 0 to 9 hours 59 minutes 59 seconds. Time delay shall be automatically bypassed if emergency source fails and normal source is acceptable.

5. A cooldown time delay shall be provided on shutdown of engine generator, Adjustable 0 to 60 minutes 59 seconds.

6. All adjustable time delays shall be field adjustable without the use of special tools.

7. A time delay activated output signal shall also be provided to drive an external relay(s) for selective load disconnect control. The controller shall have the ability to activate an adjustable 0 to 5 minutes 59 seconds time delay in any of the following modes:
   a. Prior to transfer only.
   b. Prior to and after transfer.
   c. Normal to emergency only.
   d. Emergency to normal only.
   e. Normal to emergency and emergency to normal.
   f. All transfer conditions or only when both sources are available.

8. In the event that the alternate source is not accepted within the configured Failure to Accept time delay, the common alert indication shall become active.

9. The controller shall also include the following built-in time delay for delayed transition operation.

10. A time delay for the load disconnect position for delayed transition operation adjustable 0 to 5 minutes 59 seconds.

2.5 ADDITIONAL FEATURES

A. The user interface shall be provided with test/reset modes. The test mode will simulate a normal source failure. The reset mode shall bypass the time delays on either transfer to emergency or retransfer to normal.

B. A set of contacts rated 5 amps, 30 VDC shall be provided for a low-voltage engine start signal. The start signal shall prevent dry cranking of the engine by requiring the generator set to reach proper output, and run for the duration of the cool down. setting, regardless of whether the normal source restores before the load is transferred.

C. Auxiliary contacts, rated 10 amps, 250 VAC shall be provided consisting of one contact, closed when the ATS is connected to the normal source and one contact closed when the ATS is connected to the emergency source.

D. A single alarm indication shall light up the alert indicator and de – energize the configured common alarm output relay for external monitoring.

E. LED indicating lights shall be provided; one to indicate when the ATS is connected to the normal source (green) and one to indicate when the ATS is connected to the emergency source (red).

F. LED indicating lights shall be provided and energized by controller outputs. The lights shall provide true source availability of the normal (green) and emergency (red) source, as determined by the voltage sensing trip and reset settings for each source.

G. LED indicating light shall be provided to indicate switch not in automatic mode (manual); and blinking (amber) to indicate transfer inhibit.

H. LED indicating light shall be provided to indicate any alarm condition or active time delay (red).

I. Provide the ability to select “commit/no commit to transfer” to determine whether the load should be transferred to the emergency generator if the normal source restores before the generator is ready to accept the load.

J. A variable window inphase monitor shall be provided in the controller. The monitor shall control transfer so that motor load inrush currents do not exceed normal starting currents, and shall not require external control of power sources. The inphase monitor shall be specifically designed for and be the product of the ATS manufacturer. The inphase monitor shall be equal to ASCO feature 27.

K. An engine generator exercising timer shall be provided to configure weekly and bi- weekly automatic testing of an engine generator set with or without load for 20 minutes fixed. It shall be capable of being configured to indicate a day of the week, and time weekly testing should occur.

L. Terminals shall be provided for a remote contact to signal the ATS to transfer to emergency. This inhibit signal can be enabled through the keypad or serial port.

M. System Status - The controller LCD display shall include a “System Status” screen which shall be readily accessible from any point in the menu by depressing the “ESC” key. This screen shall display a clear description of the active operating sequences and switch position. For example,
Normal Failed
Load on Normal
TD Normal to Emergency 2min 15s

Controllers that require multiple screens to determine system status or display “coded” system status messages, which must be explained by references in the operator’s manual are not permissible.

N. Self Diagnostics – The controller shall contain a diagnostic screen for the purpose of detecting system errors. This screen shall provide information on the status input signals to the controller which may be preventing load transfer commands from being completed.

O. Communications Interface – The controller shall be capable of interfacing, through an optional serial communication port with a network of transfer switches, locally (up to 4000 ft.). Standard software specific for transfer switch applications shall be available by the transfer switch manufacturer. This software shall allow for the monitoring, control, and setup of parameters.

P. Data Logging – The controller shall have the ability to log data and to maintain the last 99 events, even in the event of total power loss. The following events shall be time and date stamped and maintained in a non – volatile memory.

1. Event Logging
   a. Data and time and reason for transfer normal to emergency
   b. Data and time and reason for transfer emergency to normal
   c. Data and time and reason for engine start
   d. Data and time engine stopped
   e. Data and time emergency source available
   f. Data and time emergency source not available

2. Statistical Data
   a. Total number of transfers
   b. Total number of transfers due to source failure
   c. Total number of day's controller is energized
   d. Total number of hours both normal and emergency sources are Available
   e. Total time load is connected to normal
   f. Total time load is connected to emergency
   g. Last engine start
   h. Last engine start up time
   i. Input and output statuS

Q. Accessory Package - An accessory bundle shall be provided that includes:

1. A fully programmable engine exerciser with seven independent routines to exercise the engine generator, with or without load on a daily weekly, bi – weekly, or monthly basis.
2. Event log display that shows event number, time and date of events, event type, and reason (if applicable). A minimum of 300 events shall be stored.
3. RS – 485 communications port enabled.
4. Common alarm output contact.

R. Expansion Module - A relay expansion module (REX) is a standard feature when delayed transition transfer is specified. A REX module shall also be provided for open transition transfer that includes one form C contact for source availability of the normal (18G) and emergency (18B) sources. Additional output relay shall be provided to indicate a common alarm. The REX module shall have the capability of being daisy chained for multiple sets of contacts. (This feature shall be equal to ASCO accessory 18RX, and shall be capable of being added to existing switches without modification).

2.6 WITHSTAND AND CLOSING RATINGS

A. The ATS shall be rated to close on and withstand the available RMS symmetrical short circuit current at the ATS terminals with the type of overcurrent protection shown on the plans. WCR ATS ratings shall be as follows when used with specific circuit breakers:

ATS Size	Withstand & Closing Rating MCCB (480v/60hz)	W/CLF

800 – 1200	65,000A (and 50kA Time-Based Rating)	200,000

PART 3 - EXECUTION

3.1 INSTALLATION

A. Check out transfer switch connections and operations and place in service.

B. Adjust control and sensing devices to achieve specified sequence of operation.

3.2 SERVICE REPRESENTATION

A. The manufacturer shall maintain a national service organization of employing personnel located throughout the contiguous United States. The service center's personnel must be factory trained and must be on call 24 hours a day, 365 days a year.

B. The manufacturer shall maintain records of each switch, by serial number, for a minimum of 20 years.

C. For ease of maintenance, the transfer switch nameplate shall include drawing numbers and serviceable part numbers.

3.3 TRAINING

A. Demonstrate operation of transfer switch in normal, and emergency modes.

B. Furnish 4 hours of instruction each for two persons, to be conducted at project site with manufacturer's representative.

3.4 TESTS AND CERTIFICATION

A. The complete 3ATS shall be factory tested to ensure proper operation of the individual components and correct overall sequence of operation and to ensure that the operating transfer time, voltage, frequency and time delay settings are in compliance with the specification requirements.

B. Upon request, the manufacturer shall provide a notarized letter certifying compliance with all of the requirements of this specification including compliance with the above codes and standards, and withstand and closing ratings. The certification shall identify, by serial number(s), the equipment involved. No exceptions to the specifications, other than those stipulated at the time of the submittal, shall be included in the certification.

C. The ATS manufacturer shall be certified to ISO 9001: 2008 International Quality Standard and the manufacturer shall have third party certification verifying quality assurance in design/development, production, installation and servicing in accordance with ISO 9001: 2008.

END OF SECTION

SECTION 27 05 23 TELEVISION SIGNAL DISTRIBUTION SYSTEM

PART 1 GENERAL

1.01 SCOPE OF WORK:

A. All applicable portions of Division 26 shall apply to this section as though written herein completely.

B. Provide a complete and operable television signal distribution system including, but not limited to, wall-taps, splitters, amplifiers, back-boxes, wiring, terminations and required programming to match existing functions. The distribution system shall furnish signals to TELEVISION outlets shown on plan. The system shall pass all channels without noticeable degradation of intelligence of color fidelity, suitable for the proper connection of standard EIA TELEVISION receivers and shall deliver a minimum of 10dbmV signal strength to each receiver on every TELEVISION channel in the system; this condition shall be met when every outlet is connected to a lead. Zero dbmV equals 1,000 microvolts across 75 Ohms.

C. The work under this section includes all labor, materials, equipment, and accessories required to furnish and install complete systems functioning in compliance with the manufacturer's specifications and the Fire Department requirements.

1.02 RELATED WORK:

Document affecting work of this section include, but are not necessarily limited to, General Conditions, Supplementary Conditions and sections of Divisions 1 and 26 of these specifications.

A. The work described by this part includes the furnishing of all materials, equipment, supplies, labor and the performing of all operations necessary for the installation of complete and operating systems.

B. All conduits, outlet boxes, back boxes, junction boxes, terminal cabinets, backboards, wiring, cables, equipment, devices, etc., shall be furnished and installed complete under this section. Conduit and junction box sizes shall be determined by the TELEVISION system contractor for the particular wire and cable fills required for the systems installed. (Conduit sizes shall comply with the California Electrical Code). The entire responsibility of the system, including the installation, operation, function, testing and maintenance for one (1) year after final acceptance under this section shall be the responsibility of the TELEVISION system contractor.

C. The TELEVISION system contractor shall furnish and install all equipment, cables, devices, and other materials even though not specifically mentioned herein, which are necessary for the proper integration of the system so that the system shall perform the functions listed herein in compliance with all specified requirements.

1.03 GENERAL REQUIREMENTS

A. The TELEVISION system contractor shall hold a valid State of California C-7 License, shall have completed at least 20 projects of equal scope, shall have been in business of furnishing and installing communication systems of this type for at least five years, and capable of being bonded to assure the owner of performance and satisfactory service during the guarantee period.

B. The TELEVISION system contractor shall provide a letter with submittals from the manufacturer of the system, or the major components of the system, to the Fire Department stating that the TELEVISION system contractor is a certified representative

and that manufacturer has a service representative assigned to provide repair and mitigation to the system(s) within a 24 hour time period.

C. The TELEVISION system contractor shall hold all other licenses required by the legally constituted authorities having jurisdiction over the work.

D. The TELEVISION system contractor shall be a factory authorized distributor and warrantee station for the brand of equipment specified and shall maintain a fully equipped service organization capable of furnishing adequate repair service to the equipment. The TELEVISION system contractor shall maintain a spare set of all major parts for the system at all times. All system components shall be 100% backed up with stock at contractor's shop.

1.04 QUALITY ASSURANCE:

A. It is the intent of these specifications to establish a standard of quality for labor and material to be installed. The Base Bid shall include materials as specified <u>without exception.</u> For any proposed substitution, complete descriptive, technical and cost comparison data and test reports shall be submitted for review during the bidding period. The Contractor shall reimburse the Architect for any additional engineering charges and shall pay all charges of other trades resulting from substitutions. Proposed substitutions shall be listed on the bid form, stating the reasons for substitution and the amount to be deducted from the bid if the substitution is allowed. Final approval of the alternate system shall be determined at the time of job completion. Failure to provide the "precise functional equivalent" shall result in the removal of the alternate system and installation of the specified system at the contractor's expense.

B. If a substitution item is given final acceptance by the Owner, the contractor shall pay all costs (including travel, lodging, meals, computers, etc….) required to provide factory certification, equal to that of a Factory Authorized Distributor of the substituted item, for two (2) selected Owners representatives. This training shall occur at the primary factory of the substituted item in question and shall allow the selected Owners representatives to provide any and all Factory / Manufacturer approved repairs, services, software upgrades, etc… without affecting any available or applicable Manufacturer Warranties.

C. All of the TELEVISION system equipment shall be furnished and installed by the Authorized Factory Distributor of the equipment. The Contractor shall furnish a letter from the manufacturer of all major equipment, which certifies that the TELEVISION system contractor is the Authorized Distributor and that the equipment has been installed according to factory intended practices. The Contractor shall also furnish a written guarantee from the manufacturer that they will have a service representative assigned to this area for the life of the equipment.

D. All TELEVISION system components supplied shall be listed by Underwriter's Laboratories. A copy of the UL listing card for the proposed system shall be included with the contractor's submittal.

E. The material in this section will be covered by a five year material warranty policy.

1.05 SUBMITTAL AND MANUALS

A. Comply with all requirements of the General Conditions, Supplementary Conditions and applicable sections of Divisions 1 and 16 of these specifications.

B. Additional requirements of this section are:
   1. Within thirty-five (35) calendar days after the date of award of the Contract, the Contractor shall submit to the Architect for review, eight copies of a complete submission.
   2. The submission shall consist of five major sections with each section separated with index tabs. Each page in the submission shall be numbered chronologically and shall be summarized in the index.
   3. The first section shall be the "Index" which shall include the project title and address, name of the firm submitting the proposal and name of the Architect.
   4. The second section shall include a copy of the TELEVISION system contractor valid C-7 California State Contractors License, letters of factory authorization and guaranteed service, list of 20 projects of equal scope and list of proposed instrumentation to be used by the Contractor.
   5. The third section shall contain the comparative specification listing, including a complete listing of the characteristics of the equipment to be furnished next to all of the specified equipment's features and functions as stated in the specifications and data sheets.
   6. The fourth section shall contain an original factory data sheet for every piece of equipment in the specifications.
   7. The fifth section shall contain a wiring designation schedule for each circuit leaving each piece of equipment and drawings showing system wiring plans.
   8. The submittal shall also include, but not be limited to, floor plans indicating location of equipment, system devices, single line diagram, required wire/cable between equipment and devices, wiring/connection diagrams and a written description of the system operation and functions.

C. The Contractor shall provide two copies of an "Operating and Servicing Manual" for the system. The manuals shall be bound in flexible binders. All data shall be printed material or typewritten. Each manual shall include the following: Instructions necessary for the proper operation and servicing of the system; complete as-built installation drawings of the system; a wiring destination schedule for each circuit leaving for each piece of equipment.

PART 2 - PRODUCTS

2.01 TELEVISION SIGNAL DISTRIBUTION

A. Room taps: Blonder-Tongue #V-3889 with isolation as required.

B. Amplifier: Blonder-Tongue #Bida 550-50 or RMDA550-50 if rack mounted with filters and return amp modules as required. Furnish minimum of one (1) at each terminal backboard.

C. Terminators:
   1. Blonder-Tongue #BTFTP and splitters CRS-2 or 4 as required.
   2. RJ45 Cat 6 connectors.
   3. HDMI pass thru connectors and HDMI splitter.

D. Wire/cable:
   1. RG6 Coax cable.
   2. Cat 6 UTP cable.
   3. HDMI cable.

E. System, including wire/cable, shall be provided, installed and terminated by the television system contractor.

F. Unless otherwise noted on plan. Provide combination coax / RJ45 wall plate at each TV outlet indicated on plan.

PART 3 - EXECUTION

3.01 INSTALLATION

A. Terminate a dedicated Cat 6 data cable and RG6 coax cable at each TV outlet. Home-run the Cat 6 cable from each TV outlet to the MDF and the RG6 cable from each TV outlet to the TV head-end equipment in the Data room. Refer to Section 27 17 43 for the Cat 6 cable requirements.

B. Terminate a dedicated Cat 6 data cable, an HDMI cable, and RG6 coax cable at each Conference room and Dayroom TV outlet. Home-run the Cat 6 cable from each TV outlet to the MDF. Home-run the RG6 cable from each TV outlet to the TV head-end equipment in the Data room. Run dedicated HDMI cable from the TV to the HDMI connector(s) at the “A/V’ (HDMI) outlets. Refer to Section 27 17 43 for the Cat 6 cable requirements.

C. Terminate a dedicated Cat 6 data cable, an HDMI cable, and RG6 coax cable at each Exercise room TV outlet. Home-run the Cat 6 cable from each TV outlet to the MDF. Home-run the RG6 cable from each TV outlet to the TV head-end equipment in the Data room. Run the HDMI cable from each TV to the HDMI splitter at the primary TV monitor, and an HDMI cable from the splitter to the “A/V’ (HDMI outlet) at the secondary monitor location. Refer to Section 27 17 43 for the Cat 6 cable requirements.

D. The wiring of the system shall be executed in accordance with the drawings and the equipment manufacturer's wiring diagrams. Should any variations in these requirements occur, the contractor shall notify the architect before making any changes. It shall be the responsibility of the factory authorized distributor of the specified equipment to install the equipment and guarantee the system to operate as per plans and specifications.

E. Furnish all conductors, equipment plugs, terminal strips, etc., and labor to install a complete and operable system.

F. The cables within the rack or cabinets shall be carefully cabled using ty-raps. All cables shall be numbered for identification.

G. Splices of conductors in underground pull boxes is not permitted.

H. The labor employed by the contractor shall be regularly employed in the installation and repair of communication systems and shall be acceptable to the owner and architect to engage in the installation and service of this system.

I. The contractor shall thoroughly clean all equipment and materials. All exposed parts of the equipment, cabinets, and other equipment shall be left in a clean condition, unblemished and free of all dirt, dust, smudges, spots, fingerprints, etc., The contractor shall remove all debris and rubbish occasioned by the electronic systems work from the site. The contractor shall thoroughly clean all buildings of any dirt, debris, rubbish, marks, etc., Caused by the performance of this work.

J. The contractor shall provide not less than eight (8) hours for instruction of personnel in the operation and maintenance of the systems. This instruction time shall be divided as directed by the Owner.

K. All outlets and unused taps shall be furnished with an “F” connector with a 75ohm terminating resistor.

L. All TV outlets shall be furnished with a terminated 6’-0” RG6, HDMI and Cat 6 patch cable/cord for the Owner’s use.

M. The contractor shall be responsible for reviewing the plans and specifications to ensure each room, where TV signal distribution system equipment is to be installed, has sufficient space to accommodate the system cabinets, equipment and terminations while maintaining code mandated clearances about said equipment. The contractor shall identify problem areas prior to bid, include all costs required for corrective measures in his bid and submit alternate equipment and materials suitable for the installation to the Architect/Engineer for acceptance as part of the product submittal process.

3.02 WARRANTY

A. The entire system shall be warranted free of mechanical or electrical defects for a period of one (1) year after final acceptance of the installation. Any material showing mechanical or electrical defects shall be replaced promptly at no expense to the purchaser.

B. The contractor shall maintain a competent service organization and shall, if requested, submit a service maintenance agreement to the owner after the end of the guarantee period.

C. A typewritten notice shall be posted at the equipment rack which shall indicate the firm, address and telephone number to call when service is necessary. The notice shall be mounted in a neatly finished metal frame with a clear plastic window and securely attached to the inside of the door.

3.03 TESTING

A. Provide all instruments for testing and demonstrating in the presence of the owner's inspector that the frequency response is as stated in the factory data sheets. Check all circuits and wiring to verify they are free of shorts and grounds. Perform all tests stated of the TV outlets. Document the dB of channel 2 and channel 54. The system and all outlets shall be adjusted for a minimum of 15dB on both reference channels. The A/V reference for all documented tests are to be performed with NTSC color bar pattern and pink noise audio generated on both frequencies. The difference between channel 2 and channel 54 shall not exceed 3dB at any TV outlet.

B. The owner reserves the right to make independent tests of all equipment furnished to determine whether or not the equipment complies with the requirements specified herein and to accept or reject any or all of the equipment on the basis of the results thereby obtained.

C. Upon activation of the City furnished local CATV feed for the station, the contractor awarded this section shall provide connection and balancing of the system.

D. Written test reports are to be provided by the installing contractor to indicate the channel 2 and 54 test reports by outlet location and the time of the verification test with the inspector of record.

END OF SECTION

SECTION 27 13 43 DATA NETWORK AND NETWORK WIRE/CABLING SYSTEM

PART 1 - GENERAL

1.1 SCOPE OF WORK

A. All applicable portions of Section 26 shall apply to this section as though written herein completely.

B. The work under this section includes all labor, materials, equipment, and accessories required to furnish and install a complete Network and Network Wire and Cabling System as indicated on the drawings and as specified herein.

C. The scope of work includes routing Cat 6 cables from the MDF in the Data room to the station outlets. All work shall be coordinated with the Fire Department IT Department.

D. All network wire/cable shall be new, provided, installed and terminated under this contract.

1.2 RELATED WORK

Documents affecting work of this section include, but are not necessarily limited to, General Conditions, Supplementary Conditions and sections of Divisions 1 and 26 of these specifications.

A. The work described by this part includes the furnishing of all materials, equipment, supplies, labor and the performing of all operations necessary for the installation of complete and operating systems.

B. All conduits, outlet boxes, back boxes, junction boxes, terminal cabinets, backboards, etc., shall be furnished and installed by the Division 26 contractor under the direction of the Communications Contractor. Conduit and junction box sizes shall be determined by the Installing Communications Contractor for the particular wire and cable fills required for the systems installed. (Conduit sizes shall comply with the California Electrical Code). The entire responsibility of the system, including the installation, operation, function, testing and maintenance for one (1) year after final acceptance under this section shall be the responsibility of the Communications Contractor.

C. The Installing Communications Contractor shall furnish and install all equipment, cables, devices, and other materials even though not specifically mentioned herein, which are necessary for the proper integration of the system so that the system shall perform the functions listed herein in compliance with all specified requirements.

1.3 GENERAL REQUIREMENTS

A. The installing Communications Contractor shall hold a valid State of California C-7 License, shall have completed at least 20 projects of equal scope, shall have been in business of furnishing and installing communication systems of this type for at least five years, and capable of being bonded to assure the owner of performance and satisfactory service during the guarantee period.

B. The installing Communications Contractor shall be a factory authorized distributor and warrantee station for the brand of equipment offered and shall maintain a fully equipped service organization capable of furnishing adequate repair service to the equipment. The Installing Communication Contractor shall maintain a spare set of all major parts for the system at all times. All circuit boards and control sub systems shall be 100% backed up with stock at contractors' shop.

C. Installing contractor shall be a Berk-Tek Leviton certified installer, and shall provide a lifetime application warranty. All products provided and installed by the certified installer shall be of the type and manufacturer required to meet the warranty criteria.

1.4 SUBMITTAL AND MANUALS

A. Comply with all requirements of the General Conditions, Supplementary Conditions and applicable sections of Divisions 1 and 26 of these specifications.

B. Additional requirements of this section are:

1. Within thirty-five (35) calendar days after the date of award of the Contract, the Contractor shall submit to the Architect for review, eight copies of a complete submission.

2. The submission shall consist of five major sections with each section separated with index tabs. Each page in the submission shall be numbered chronologically and shall be summarized in the index.

3. The first section shall be the "Index" which shall include the project title and address, name of the firm submitting the proposal and name of the Architect.

4. The second section shall include a copy of the Installing Communication Contractors valid C-7 California State Contractors License, letters of factory authorization and guaranteed service, list of 20 projects of equal scope and list of proposed instrumentation to be used by the Contractor.

5. The third section shall contain the comparative specification listing, including a complete listing of the characteristics of the equipment to be furnished next to all of the specified equipment's features and functions as stated in the specifications and data sheets.

6. The fourth section shall contain an original factory data sheet for every piece of equipment in the specifications.

7. The submittal shall also include, but not be limited to, floor plans indicating location of equipment, system devices, outlets with cable addresses, block/riser diagram, equipment rack elevation drawing indicating the placement of all rack mounted equipment, wall-plate drawing for each outlet configuration (i.e. wall plate with two RJ45 connectors), required wire/cable between equipment and devices, wiring/connection diagrams and a written description of the system operation and functions.

C. Submittals that include equipment data sheets but no plan drawings and site specific wiring diagrams shall be considered incomplete, will not be reviewed, and shall be returned to the Contractor for re-submittal.

D. The Contractor shall provide two copies of an "Operating and Servicing Manual" for the system. The manuals shall be bound in flexible binders. All data shall be printed material or typewritten. Each manual shall include the following: Instructions necessary for the proper operation and servicing of the system; complete as-built installation drawings of the system; a schematic diagram of major components with all transistor and IC complements and replacement number.

PART 2 - EQUIPMENT

2.1 NETWORK WIRE AND CABLE SYSTEM

A. Provide all necessary labor, equipment and materials for a complete system.

B. Copper Wire Cable (unshielded twisted pairs):

1. Provide Category 6 (4 pair) cables from each data system outlet indicated on the drawings to the patch panel at the MDF.

2. Provide Category 6A (4 pair) cables from each wireless access point (WAP) outlet indicated on the drawings to the patch panel at the MDF.

3. Provide Category 6A (4 pair) cables from each video surveillance camera indicated on the drawings to the patch panel at the MDF.

4. Category 6 and 6A cables shall be copper wire, 600 MHz, individually insulated and color coded, with an overall non-conductive jacket as manufactured by General Cable and meet EIA/TIA 568B wiring standard.

5. Category 6 Data cables shall have a “blue” colored outer jacket.

6. Category 6A Data (WAP) cables shall have a “gray” colored outer jacket.

7. Category 6 Voice/Telephone cables shall have a “white” colored outer jacket.

8. Category 6A video surveillance camera cables shall have a “yellow” colored outer jacket.

9. All cables installed underground will be duct rated for that use.

D. System Outlets

1. Unless noted otherwise on plan, each Data outlet indicated on plan shall be cabled with two (2) 4-pair, category 6, 24 AWG cable, terminating on RJ45 jacks equipped with 110 type terminations, and on the data category 6 patch panels, using 110 type hardware as shown in the drawings. Data terminations will be allocated to specific termination areas and use colored designation strips.

2. Unless noted otherwise on plan, each wireless access point indicated on plan shall be cabled with two (2) 4-pair, category 6A, 24 AWG cable, terminating on RJ45 jacks equipped with 110 type terminations, and on the data category 6 patch panels, using 110 type hardware as shown in the drawings. Data terminations will be allocated to specific termination areas and use colored designation strips.

3. Unless noted otherwise on plan, each combination Voice/Data outlet indicated on plan shall be cabled with three (3) 4-pair, category 6, 24 AWG cables. Voice/Data cables shall terminate on RJ45 jacks equipped with 110 type terminations, and on the data category 6 patch panels, using 110 type hardware as shown in the drawings. Voice/Data terminations will be allocated to specific termination areas and use colored designation strips.

4. Unless noted otherwise on plan, each Voice outlet indicated on plan shall be cabled with one (1) 4-pair, category 6, 24 AWG cable, terminating on RJ45 jacks equipped with 110 type terminations, and on the data category 6 patch panels, using 110 type hardware as shown in the drawings. Voice terminations will be allocated to specific termination areas and use colored designation strips.

5. Unless noted otherwise on plan, each video surveillance camera outlet indicated on plan shall be cabled with one (1) 4-pair, category 6A, 24 AWG cable, terminating on RJ45 jacks equipped with 110 type terminations, and on the data category 6 patch panels, using 110 type hardware as shown in the drawings. Data terminations will be allocated to specific termination areas and use colored designation strips.

6. Unless noted otherwise on plan, each TV monitor indicated on plan shall be cabled with one (1) 4-pair, category 6A, 24 AWG cable, terminating on RJ45 jacks equipped with 110 type terminations, and on the data category 6 patch panels, using 110 type hardware as shown in the drawings. Data terminations will be allocated to specific termination areas and use colored

designation strips

7. Provide faceplates with RJ45 connectors and blanks as required.

8. Inserts for data/computer network and video monitor applications shall be “blue”.

9. Inserts for WAP network applications shall be “grey”.

10. Inserts for voce/telephone applications shall be “white”.

11. Inserts for video surveillance network applications shall be “yellow”.

12. Provide “white” covers for blanks/spaces.

E. Provide the following equipment racks and networking distribution equipment in the Data room indicated on plan:

1. MDF rack – Minimum two (2) 2-post 86”H floor mount enclosures, with vertical cabling sections, shelves, power strip, cable management system, and 3000VA, 208V. 1 phase rack mounted-UPS. The equipment enclosures shall house all network equipment, telephone head-end equipment and VoIP system components. Tripp-Lite SmartRack 45U Heavy-Duty 2-Post Open Frame Rack, 12" deep Model #SR2POSTDP12HD.

2. Minimum rack mounted network distribution equipment to be installed in the rack shall include, but not be limited to, patch panels, Cat 6 modular jacks (blue, gray, white and yellow). Quantity to be determined by the quantity of cables to be terminated in the rack plus 20% spare.

3. Provide patch panels as required to terminate all Cat 6 and Cat 6A cables indicated on plans plus 20% spare.

   a. Patch panels shall be category 6 and 6A, 48-port patch panels (loaded) and consist of the panel, wiring blocks, rack mount strain relief bar, and port modules.

   b. Patch panel shall mount to TIA-EIA complaint 19” rack mount bracket. Patch panel shall utilize standards compliant RJ45 jacks for station cable termination.

   c. Jacks or insert shall be RJ45, 6-port modules with individually replaceable jacks in accordance with TIA/EIA 568B wiring standard, FCC Part 68, UL Listed, NEC Article 800. It shall accommodate 110-type jack of the 4 pair category 6 cable and category 6A. Jack shall support gigabit ethernet, 100 Base-T, 10 Base-T and analog connections.

   d. Backside strain relief shall be provided for every row of ports. It shall be attached to the TIA/EIA compliant rack via rear mounting holes.

4. Provide a Category 6 and 6A patch cord, depending on system served, for each position in use plus 20% spare.

5. Universal cable runway – Provide with rack to runway mounting plate and required hardware.

6. MDF components that are part of the structured wiring solution shall be covered by the lifetime warranty.

F. Copper Wire Cable Installation:

1. Wire/cables connecting to equipment racks shall be installed with not less than 10 feet of slack cable between the rack and terminal backboard. The slack cable shall be coiled in the light box.

2. Provide 18 inches of cable slack at computer data system outlets.

3. The minimum bending radius for all cables and the maximum pulling tension shall not exceed manufacturer's recommendations.

4. Cables installed in pull boxes on terminal backboards shall be installed on wall mounted cable support racks.

5. Provide a full 360 degree loop of cable around pull box interiors.

6. Cable pulling shall use a split mesh grip over the cable jacket connection directly to copper conductors shall not occur.

7. A dynameter to measure pulling tension shall be used on all cable runs in excess of 200 feet or more with 180 degrees in bends. The actual pulling tension value shall be calculated and recorded for each pull.

8. Pulling eyes on copper conductor shall not be used.

9. Cable pulling lubricants shall be continuously applied to all cables and be specifically approved by the cable manufacturer.

10. Where cables are "pulled through" or pulled from a "center of run pull" without splices or terminations lead out the cables at pull boxes and conduits taking care to feed them in again by hand for the next run.

11. For each cable pull where a cable direction changes is required, flexible feed-in tubes, pullout devices, multi-segmented sheaves, etc. shall be used to insure proper cable pulling tensions and side wall pressures. Cables shall not be pulled directly around a short right angle bend. Any device or surface the cable comes in contact with when under pull-in tension shall have a minimum radius 50% greater than the final specified minimum installed cable bending radius.

12. Separation of individual twisted pair to be no more than .5" from termination point.

G. Data room terminal equipment ground bus (TEGB) - Provide a wall mounted TEGB ground bus at each location where computer networking equipment is provided. The TEGB ground bus shall be copper 1/4 inch x 2 inch (nominal) x 12 inches long (minimum). Install the TEGB on the wall with a minimum of two "stand-off" electrical insulators. Drill and tap the ground bus and provide bolted type ground lugs for connection of ground conductors size #10 AWG - #1 AWG. Provide (4) spare unused ground lugs on the TEGB. Provide 1 1/4 inch conduit with 1 #2 AWG copper insulated ground conductor from the TEGB to the building main ground reference bus

H. Splicing of cables or conductors is not permitted.

I. All cables, outlets and terminations shall be labeled and designated in accordance with the City/Fire Department I.T. Department standards. Contractor shall confirm labeling scheme with the City/Fire Department in advance.

J. The labor employed by the contractor shall be regularly employed in the installation and repair of communication systems and shall be acceptable to the owner and architect to engage in the installation and service of this system.

K. Each individual copper wire/conductor in all terminated and unterminated cables provided in the contract shall be tested after installation, splicing and termination is completed. Testing shall be done by an independent testing laboratory.

L. Upon completion of above tests Contractor is to submit a report presenting test results for all measurements. With the report, submit written certification that the installation conforms to specifications. Provide data on memory sticks in Microtest format.

M. Test Parameters:

1. Category 6 cables shall be tested to meet EIA/TIA 568-B.1 and 568-B.2, 250 MHz performance specifications and for continuity, opens, breaks, shorts, and grounds, near end cross-talk, impedance, capacitance, and resistance.

2. UTP cable not meeting EIA Category 6 and 250 MHz specifications shall be replaced by the Contractor at no charge to the contract.

3. Cables shall be tested up to 600 MHz.

N. LAN Electronics for Data Network: Provided and installed by the City/Fire Department I.T. Department.

PART 3 - EXECUTION

3.1 INSTALLATION

A. The wiring of the system shall be executed in accordance with the drawings and the equipment manufacturer's wiring diagrams. Should any variations in these requirements occur, the contractor shall notify the architect before making any changes. It shall be the responsibility of the factory authorized distributor of the approved equipment to install the equipment and guarantee the system to operate as per plans and specifications.

B. Furnish all conductors, equipment plugs, terminal strips, etc., And labor to install a complete and operable system.

C. The cables within the rack or cabinets shall be carefully cabled and laced with T&B model ty-rap series 500 cable straps. All cables numbered for identification.

D. Splicing of conductors is not permitted.

E. Maximum distance for UTP cable is 300 feet. Contractor shall verify distances between the MDF and the system outlets after the installation of the raceways/conduits and back boxes is complete. Where distances exceed 250 feet the contractor shall provide an intermediate distribution frame (IDF) to serve the affected outlets.

F. The labor employed by the contractor shall be regularly employed in the installation and repair of communication systems and shall be acceptable to the owner and architect to engage in the installation and service of this system.

G. The contractor shall thoroughly clean all equipment and materials. All exposed parts of the equipment, cabinets, and other equipment shall be left in a clean condition, unblemished and free of all dirt, dust, smudges, spots, fingerprints, etc., The contractor shall remove all debris and rubbish occasioned by the electronic systems work from the site. The contractor shall thoroughly clean all buildings of any dirt, debris, rubbish, marks, etc., Caused by the performance of this work.

H. The contractor shall provide not less than eight (8) hours for instruction of personnel in the operation

and maintenance of the systems. This instruction time shall be divided a directed by the Owner.

I. The contractor shall be responsible for reviewing the plans and specifications to ensure each room, where data network equipment is to be installed, has sufficient space to accommodate the system cabinets, equipment and terminations while maintaining code mandated clearances about said equipment. The contractor shall identify problem areas prior to bid, include all costs required for corrective measures in his bid and submit alternate equipment and materials suitable for the installation to the Architect/Engineer for acceptance as part of the product submittal process.

3.2 WARRANTY

A. The entire system shall be warranted free of mechanical or electrical defects for a period of one (1) year after final acceptance of the installation. Any material showing mechanical or electrical defects shall be replaced promptly at no expense to the purchaser.

B. The contractor shall maintain a competent service organization and shall, if requested, submit a service maintenance agreement to the owner after the end of the guarantee period.

C. A typewritten notice shall be posted at the equipment rack which shall indicate the firm, address and telephone number to call when service is necessary. The notice shall be mounted in a neatly finished metal frame with a clear plastic window and securely attached to the inside of the door.

D. Submit lifetime warranty of the structured wiring solution.

3.3 TESTING

A. Provide all instruments for testing and demonstrating in the presence of the owner's inspector that the frequency response is as stated in the factory data sheets. Check all circuits and wiring to verify they are free of shorts and grounds. Perform all tests stated in each separate system specification.

B. The owner reserves the right to make independent tests of all equipment furnished to determine whether or not the equipment complies with the requirements specified herein and to accept or reject any or all of the equipment on the basis of the results thereby obtained.

3.4 RECORD DRAWINGS

A. Submit as-built drawings of the structured cabling in PDF format and AutoCAD format.

END OF SECTION

SECTION 27 51 30 FIRE STATION ALERTING SYSTEM

PART 1 - GENERAL

1.01 SUMMARY

A. Furnish and install the Fire Station Alerting System Infrastructure and all applicable appurtenances as herein specified and as shown on the applicable drawings. The purpose of this document is to provide a reference for the Contractor to implement the necessary features for the installation of the Fire Station Alerting System (FSAS) equipment.

B. The FSAS system equipment shall be provided and installed by the FSAS contractor.

C. Conduit/raceways and back-boxes shall be provided and installed by the Electrical Contractor. All work shall be coordinated and in compliance with the FSAS installing contractor requirements.

D. Low voltage wire/cable shall be provided and installed by the FSAS installing contractor.

E. Final location and quantity of FSAS equipment and back-boxes shall be per the FSAS equipment plans. The contractor shall obtain a copy of the FSAS equipment drawings prior to rough-in.

F. Provide 120V. dedicated circuits for FSAS control panels and miscellaneous equipment requiring 120V. power as indicated on the FSAS drawings.

G. The electrical contractor shall notify the Architect/Engineer wherever a discrepancy in quantity or size of conduit, wire, equipment, devices, back-boxes, etc., (all materials), arises between the plans and the FSAS equipment plans. The electrical contractor shall obtain direction from the Architect/Engineer prior to proceeding with the work.

H. The electrical contractor shall be responsible for providing and installing specialty back-boxes. The electrical contractor shall patch, repair and refinish walls, ceilings or floors disturbed by the installation of the subject back boxes.

I. All requirements of Section 260000 shall apply to this section.

J. General Information:
   1. All conduits shall be sized per the California Electrical Code and shall be provided with pull strings.
   2. The alerting speakers are intended to function independent of any other system. Speaker backboxes are to be furnished by the alerting system vendor and Contractor installed.
   3. Standard 4” square and 4 11/16” square wall mounted equipment back boxes shall be provided and installed by the Contractor.
   4. Specialty/custom back-boxes shall be furnished by the FSAS contractor and installed by the electrical contractor.
   5. Radio, Antenna’s and Mast shall be provided and installed by the FSAS contractor.
   6. Electrical contractor to provide a 2” conduit from the alerting system head-end equipment to the roof at the antenna indicated on the FSAS equipment plan.
   7. Contractor shall provide a 600 ohm analog audio connection from the telephone system to the Fire Station Alerting system. Provide required cabling to connect the alerting system and the telephone switch.

K. Submittals:
   1. Comply with all requirements of the General Conditions, Supplementary Conditions and applicable sections of Divisions 1 and 26 of these specifications.

2. Additional requirements of this section are:
   a. Within thirty-five (35) calendar days after the date of award of the Contract, the Contractor shall submit to the Architect for review, eight copies of a complete submission.
   b. The submission shall consist of five major sections with each section separated with index tabs. Each page in the submission shall be numbered chronologically and shall be summarized in the index.
   c. The first section shall be the "Index" which shall include the project title and address, name of the firm submitting the proposal and name of the Architect.
   d. The second section shall include a copy of the Installing Communication Contractors valid C-10 California State Contractors License, letters of factory authorization and guaranteed service, list of 20 projects of equal scope and list of proposed instrumentation to be used by the Contractor.
   e. The third section shall contain the comparative specification listing, including a complete listing of the characteristics of the equipment to be furnished next to all of the specified equipment's features and functions as stated in the specifications and data sheets.
   f. The fourth section shall contain an original factory data sheet for every piece of equipment in the specifications.
   g. The fifth section shall contain a wiring designation schedule for each circuit leaving each piece of equipment and drawings showing system wiring plans.
   h. The submittal shall also include, but not be limited to, floor plans indicating location of equipment, system devices, block diagram, required wire/cable between equipment and devices, wiring/connection diagrams and a written description of the system operation and functions.

PART 2 - PRODUCTS

2.01 CONDUIT:

1. Intermediate Metal Conduit (IMC), shall be hot-dipped galvanized in accordance with UL 1242 and meeting Federal Specification WWC-581 (latest revision).

2. Electrical Metallic Tubing (EMT), shall be zinc-coated steel with baked enamel or plastic finish on inside surfaces.

3. Flexible metal conduit shall be constructed of aluminum or hot-dipped galvanized steel strips wound spirally with interlocking edges to provide greatest flexibility with maximum strength. Interior surfaces shall be smooth and offer minimum drag to pulling in conductors. Used only as directed by the Engineer.

4. Liquid-tight conduit (Seal-Tite) shall be galvanized steel flexible conduit as above except with moisture and oil-proof jacket, pre-cut lengths and factory installed fittings. For outdoor installations and final connection to speakers.

5. Non-Metallic Conduit:
   a. Polyvinyl chloride (PVC) rigid conduit, Schedule 40, Type II for underground installation only.
   b. Conduit and fitting shall be produced by the same manufacturer.

6. Electrical non-metallic tubing (ENT) is not permitted.

2.02 CONDUIT FITTINGS:

1. Connector, coupling, locknut, bushings and caps used with rigid conduit shall be steel, threaded and thoroughly galvanized. Bushings shall be insulated.

2. EMT fittings, connectors and couplings, shall be steel, zinc or cadmium plated, raintight, threadless, compression or tap-on multiple point, steel locking ring type with insulated throat.

3. Flexible steel conduit connectors shall be malleable iron clamp or squeeze type or steel twist-in type with insulated throat. The finish shall be zinc or cadmium plating.

4. Die cast, set screw or indenter type fittings are not acceptable.

2.03 OUTLET BOXES

1. For 120V. circuits shall be 4” square x 2 1/8” deep, steel, knockout type, mounted flush with in wall. Provide with plaster rings and wall plate.

2. For FSAS devices, outlet boxes shall be 4 11/16” square x 2 1/8” deep, steel, knockout type, mounted flush with in wall. Provided with plaster rings and leave outlet box ready for installation of Owner furnished wall plate.

3. FSAS specialty/custom boxes shall be furnished by the FSAS contractor and installed by the electrical contractor. Boxes shall be mounted flush with wall unless otherwise noted on the FSAS equipment drawings.

4. For wet or damp locations, outlet boxes shall be heavy cast aluminum or cast iron with threaded hubs; covers shall be watertight with gaskets and non-ferrous screws.

2.04 WIRE / CABLE:

1. For 120V. circuits, provide type THHN/THWN thermoplastic, 600 volt, UL approved, dry and wet locations. Refer to Section 260000 for wire requirements.

2. For FSAS communications cable, provided by the FSAS system vendor, installed by the contractor.

3. Wire and cable shall be new, manufactured not more than six (6) months prior to installation, shall have size, type of insulation, voltage rating and manufacturer's name permanently marked on outer covering at regular intervals.

4. No conductors carrying 120 volt or more shall be smaller than #12 AWG.

2.05 CABLE TRAY (MDF / IDF ROOMS):

1. Comm Room: Cable tray shall be aluminum tray or corrugated ventilated trays. Tray shall be at least 18 inches wide and 2 inches deep.

2. Cable racking: Use reusable Velcro cable managers (cable ties) to create a neat and orderly appearance and practical installation.

3. Cable tray shall be secured on 10-foot centers using single center mounted steel supporting rods and bottom “T” connector, angle wall supports, or a standard trapeze type support system.

4. Cable tray shall be grounded and bonded end to end.

5. Cable tray shall not be placed within 5 inches of any overhead light fixture and within 12 inches of any electrical ballast.

6. A minimum clearance of 8 inches above the cable tray must be maintained at all times.

2.06 TELEPHONE SYSTEM COORDINATION:

1. Provide interface between the stations's telephone switch and the FSAS controller to allow the phone system to page over the alerting system speakers.

2. Coordinate requirements with the FSAS contractor.

PART 3 - EXECUTION

3.01 WIRE/CABLE:

A. Homerun cables from the equipment/devices indicated on plan to the Communications Room (FSAS control panel/controller).

B. A minimum of 3ft cable length or 4ft cable loop at each device location for final termination.

C. Cabling shall be installed in raceways, supported by j-hooks or other approved support systems and terminated at station locations indicated.

D. Cabling shall be of a "Universal Cabling Plan" where station cables are wired directly as indicated on plans.

E. Cables not installed in conduit or wireways shall be properly secured and neat in appearance. Under no circumstances shall any cabling or support systems lie on or attach to the drop ceiling. All cabling shall be supported at least 12" above the drop ceiling.

F. Where accessible ceilings are non-existent, cables shall be run in conduit concealed in walls, ceilings or underfloor.

G. All cabling shall be supported a minimum of 4 feet on-center. Via 'J' hooks or other approved method.

H. Label each cable end with computer generated or neatly handwritten permanent ink permanent label.

3.02 CONDUIT/RACEWAYS:

A. Contractor shall provide and install all required conduit per local code requirements.

B. Coordinate with the FSAS contractor prior to rough-in.

C. Provide a cable tray to span the length of the Communications room and parallel to the equipment racks in the room.

3.03 TEST REPORTS

A. Contractor shall supply Test Reports, in both booklet form and electronic flat ASCII file format, showing all field tests performed to adjust each component and all field test performed to prove compliance with the specified performance criteria, upon completion of testing of the installed system.

B. Contractor shall supply one licensed copy of test equipment software which provides a means for viewing copper test results in the format that the original test equipment was designed, suitable for running in a DOS or Windows environment.

3.04 ACCEPTANCE

A. Acceptance of system shall occur after all required documentation, test results, certification of test results and test operation by the City of Vista Fire Department has occurred. Final acceptance shall include a visual inspection of the system in its entirety and written approval by the City of Vista Fire Department, or their appointed representative(s).

3.05 WARRANTY

A. Contractor shall certify and warrant the complete system for a period of one year from the date of building occupancy.

B. Contractor shall certify and warrant the Cat 6 cabling system for operation at current EIA/TIA 568B 100 MHz specifications for a period of not less than 20 years.

END OF SECTION

SECTION 28 31 00 FIRE ALARM SYSTEM

PART 1 - GENERAL

1.1 SCOPE

A. This performance/Design-Build specification document provides the requirements for the installation, programming and configuration of a complete IntelliKnight 6820XL digital protocol addressable fire alarm system. This system shall include, but not be limited to, system cabinet, power supply, built in Signaling Line Circuit (SLC), 80 character LCD annunciator, six programmable “Flexput” circuits, built in dual line Digital Communicator, associated peripheral devices, communication with the Coastside Fire Protection District central station monitoring company, batteries, wiring, conduit and other relevant components and accessories required to furnish a complete and operational Life Safety System.

B. The system shall be programmed to ensure that all audible devices in the station activate when any one smoke detector or manual pull station is activated.

C. Provide low frequency notification devices in all dorm rooms and dayroom.

D. Where required by code and/or indicated on plan, provide combination smoke detector-carbon monoxide detectors. Locate the detectors in the Hallway leading to the dorm rooms and dayroom. The system shall be programmed to ensure all low frequency notification devices alarm upon activation of any one detector in the system.

E. The fire alarm system shall comply with requirements of NFPA Standard 72 for Protected Premises Signaling Systems except as modified and supplemented by this specification. The system shall be electrically supervised and monitor the integrity of all conductors.

F. The FACP and peripheral devices shall be manufactured 100% by a single U.S. manufacturer (or division thereof).

G. The Fire alarm system is a deferred approval item and the sole responsibility of the contractor to submit plans, equipment data sheets/listings, wiring diagrams and calculations to the Coastside Fire Protection District for review and approval. The fire alarm system design shall be based on the building occupancies indicated on the Architectural Code Analysis drawing and as required by the Coastside Fire Protection District.

H. The Fire Alarm submittal to the Coastside Fire Protection District shall bear the stamp and signature of a professional engineer registered in the State of California.

I. Installation of the fire alarm system shall commence upon approval of the fire alarm plans by the Coastside Fire Protection District and city plan check.

1.2 WORK INCLUDED

A. The contractor shall furnish and install a complete 24 VDC, electrically supervised, analog addressable fire alarm system as specified herein and indicated on the drawings. The system shall include but not be limited to all control panels, power supplies, initiating devices, audible and visual notification appliances, alarm devices, and all accessories required to provide a complete operating fire alarm system.

B. All fire alarm system equipment shall be listed for it’s intended purpose and be compatibility listed to assure the integrity of the complete system.

1.3 CODES AND REGULATIONS

A. Underwriters Laboratory Inc.

B. 2025 California Building Code, Part 2, Title 24.

C. 2025 California Electrical Code, Part 3, Title 24.

D. 2025 California Mechanical Code, Part 4, Title 24.

E. 2025 California Fire Code, Part 9, Title 24.

F. 2025 California Building Standards Administrative Code, Part 1, Title 24, California Code of Regulations (CCR).

G. Public Safety, Title 19, C.C.R. State Fire Marshal regulations.

H. NFPA 72, Local Alarm Systems, Current edition with California Amendments.

I. Manufacturers Specifications.

1.4 SUBMITTALS

A. General:

1. Two copies of all submittals shall be submitted to the Architect/Engineer for review.
2. Submittals reviewed and accepted by the Architect/Engineer shall be submitted to the Coastside Fire Protection District for final review and approval. Devices, equipment and services required by the Coastside Fire Protection District shall be a part of this contract and the responsibility of this contractor to provide and install the devices, equipment and services required by the Coastside Fire Protection District at no additional cost to the contract.
3. All references to manufacturer's model numbers and other pertinent information herein is intended to establish minimum standards of performance, function and quality. Equivalent compatible UL-listed equipment from other manufacturers may be substituted for the specified equipment as long as the minimum standards are met.
4. For equipment other than that specified, the contractor shall supply proof that such substitute equipment equals or exceeds the features, functions, performance, and quality of the specified equipment.

B. Shop Drawings/Product Data:

1. Within thirty-five (35) calendar days after the date of award of the Contract, the Contractor shall submit to the Architect for review, eight copies of a complete submission.
2. The submission shall consist of five major sections with each section separated with index tabs. Each page in the submission shall be numbered chronologically and shall be summarized in the index.
3. The first section shall be the "Index" which shall include the project title and address, name of the firm submitting the proposal and name of the Architect.
4. The second section shall include a copy of the Installing Fire Alarm Contractor’s valid C-7 California State Contractors License, letters of factory authorization and guaranteed service, list of 20 projects of equal scope and list of proposed instrumentation to be used by the Contractor.
5. The third section shall contain the comparative specification listing, including a complete listing of the characteristics of the equipment to be furnished next to all of the specified equipment's features and functions as stated in the specifications and data sheets.

6. The fourth section shall contain an original factory data sheet for every piece of equipment in the specifications and current CSFM listings.
7. The fifth section shall contain floor plans, voltage drop calculations for each circuit, battery calculations for the FACP and remote power supplies, sequence of operation, installation details, factory system/ device wiring diagrams and plan/site drawings indicating equipment/device locations and interconnecting wiring.

C. Manuals:

1. Submit simultaneously with the shop drawings, complete operating and maintenance manuals listing the manufacturer's name(s), including technical data sheets.
2. Wiring diagrams shall indicate internal wiring for each device and the interconnections between the items of equipment.
3. Provide a clear and concise description of operation that gives, in detail, the information required to properly operate the equipment and system.

D. Software Modifications

1. Provide the services of a factory trained and authorized technician to perform all system software modifications, upgrades or changes. Response time of the technician to the site shall not exceed 4 hours.

2. Provide all hardware, software, programming tools and documentation necessary to modify the fire alarm system on site. Modification includes addition and deletion of devices, circuits, zones and changes to system operation and custom label changes for devices or zones. The system structure and software shall place no limit on the type or extent of software modifications on-site.

E. Certifications:

Together with the shop drawing submittal, submit a certification from the major equipment manufacturer indicating that the proposed supervisor of the installation and the proposed performer of contract maintenance is an authorized representative of the major equipment manufacturer. Include names and addresses in the certification.

PART 2 - EQUIPMENT

2.1 GENERAL

A. Control Panel

The fire alarm control panel (FACP) shall be the Silent Knight 6820 analog addressable fire alarm control panel. The FACP must have a 6-amp power supply and be capable of expansion to a minimum of 50.5 total amps via bus connected expander modules that supervise low battery, loss off AC and loss of communication.

The FACP must be able to support 159 detectors and 159 analog addressable modules and expandable to a maximum of 1,110 analog addressable points per FACP. This shall be accomplished via a maximum of 63 signaling line circuits (SLC) capable of supporting up to 159 detectors and 159 addressable module devices each.

The FACP must have Drift Compensation sensitivity capabilities on detectors and be able to support 159 detectors and 159 analog addressable modules. The communication protocol on the SLC loop must be digital.

The FACP network must support up to 17 FACPs on the network providing a maximum addressable point capacity of 18,870 points (1,110 x 17 = 18,870).

The FACP must support a minimum of six programmable Flexputs. The panel must have a built in 80-character LCD annunciator with the capability of having a minimum of an additional 16 supervised remote annunciators connected in the field.

The FACP must have a built-in UL approved IP and digital communicator with the option of adding a cellular module for communications. The communicator must allow local up/downloading of system operating options, event history, and detector sensitivity data.

The FACP must automatically test the smoke detectors in compliance with NFPA standards to ensure that they are within listed sensitivity parameters and be listed with Underwriters Laboratories for this purpose.

The FACP must compensate for the accumulation of contaminants that affect detector sensitivity. The FACP must have a maintenance alert feature (differentiated from trouble condition), detector sensitivity selection, auto-programming mode, Jumpstart®, and the ability to upgrade the core operating software on site through USB or Ethernet cable.

The FACP shall have a Jumpstart feature that can automatically enroll all properly connected accessories into a functional system. Panels that do not have these capabilities will not be accepted.

The main communication bus (S-BUS RS485) shall be capable of Class A or class B configuration with a total Bus length of 6,000 feet.

B. System Wiring

The Signaling Line Circuit (SLC) and Data Communication Bus (S-BUS) shall be wired with standard NEC 760 compliant wiring, no twisted, shielded or mid capacitance wiring is required for standard installations. All FACP screw terminals shall be able to accept 12-18 AWG wire. All system wiring shall be in accordance with the requirements of NFPA 70, the National Electrical Code (NEC) and comply with article 760 of the NEC.

C. Signaling Line Circuits

Each SLC shall be capable of a wiring distance of 5,000 feet from the SLC driver module (6815) and be able to support up to 159 detectors and 159 addressable module devices. The communication protocol to SLC devices must be digital. Any SLC loop device, which goes into alarm, must interrupt the polling cycle for priority response from the FACP. The FACP must respond consistently to a device that goes into alarm on an SLC in under 10 seconds. The auxiliary 6815 SLC loop module must be capable of being located up to 6000 feet from the FACP on an RS-485 bus, which is separate from the SLC bus. The SLC shall be capable of functioning in a class A or class B configuration.

D. SLC loop devices

Devices supported must include photoelectric smoke detectors, heat detectors, combination fire and CO detectors, contact monitoring modules and relay output modules. There is to be no limit to the number of any particular device type, up to the maximum of 99 detectors and 99 modules that can be connected to the SLC.

E. Addressable detector functions

The products of combustion detectors must communicate analog values using a digital protocol to the control panel for the following functions:

1. Automatic compliance with NFPA 72 standards for detector sensitivity testing
2. Drift compensation to assure detector is operating correctly
3. Maintenance alert when a detector nears the trouble condition
4. Trouble alert when a detector is out of tolerance
5. Alert control panel of analog values that indicate fire.

F. Programmable Flexputs

The FACP shall support six programmable Flexput circuits that are capable of being programmed as supervised reverse polarity notification circuits or supervised auxiliary power circuits that can be programmed as continuous, resettable or door holder power. The circuits shall also be programmable as input circuits in class A or B configurations to support dry contact or compatible two wire smoke detectors.

G. Addressable Notification Modules

The contractor shall furnish and install where indicated on the plans, addressable notification modules, Honeywell Silent Knight Model SK-CONTROL. The modules shall be U.L. listed compatible with Honeywell Silent Knight 6820 fire alarm control panel. The notification module must provide one class A (Style Z) or class B (Style Y) notification output with one auxiliary power input. The notification module must be suitable for mounting in a standard 4 square electrical box, and must include a plastic cover plate. The notification module must provide an LED that is visible from the outside of the cover plate. The notification module must be fully programmable for such applications as required by the installation. The SK-CONTROL shall reside on the SLC loop and can be placed up to 5,000 feet from the control or 6815 SLC loop module.

H. Built-in Annunciator

The main control must have a built-in annunciator with an 80-character LCD display and feature LEDs for Alarm, Supervisory, Trouble, Silenced and Power. When in the normal condition the LCD shall display time and date based on a 200-year clock which is capable of automatic daylight savings time adjustments. All controls and programming keys are silicone mechanical type with tactile and audible feedback. Keys have a travel of .040 in. No membrane style buttons will be permissible. The annunciator must be able to silence and reset alarms. The annunciators must have twenty levels of user codes that will allow the limitation of operating system programming to authorized individuals.

I. Remote Annunciators

The fire system shall be able to support remote annunciators. All annunciators must have 80 -160-character LCD/LED displays and must feature five LEDs for Alarm, Supervisory, Trouble, Silenced, and Power. All controls and programming keys are silicone mechanical type with tactical and audible feedback. Keys shall have a travel of .040 inches. No membrane style buttons will be permitted.

The annunciator must be able to silence and reset alarms. The annunciator must have twenty levels of user codes that will limit the operating system programming to authorized individuals. The control panel must allow all annunciators to accommodate multiple users input simultaneously. Remote annunciators shall be capable of operating at 6,000 feet from the main control panel on unshielded, non-twisted cable.

The fire system shall be able to support up to 16 remote annunciators. The exact number will be determined by type, LCD or LED. LED Remote annunciators shall have individually mapped LEDs and reset and silence input.

J. I/O LED Driver Module

The fire system shall be able to support up to eight I/O modules on the SBUS that shall be used to drive remote LED graphic style displays and accommodate up to eight dry contact type switch inputs. The I/O modules shall each drive up to 40 LEDs without requiring external power connections. The I/O module inputs shall be supervised and shall be suitable for alarm and trouble circuits as well as reset and silence switches. These driver boards shall contain 80 LED outputs that are powered by an external power source.

K. Serial/Parallel Interface

The fire system shall able to support up to two serial / parallel interfaces that can drive standard computer-style printers (line printers only). The interface shall be programmable as to what information is sent to it and shall include the ability to print out Detector Status, Event History and System Programming.

L. Distributed Power Module

The contractor shall supply power modules, Models 5496 and 5895XL, compatible with the model 6820 fire alarm control panel. The power module must have 6 amps of output power, six Flexput circuits rated at 3 amps each, and two Form C relay circuits rated at 6 amps at 24 volts DC. The six Flexput circuits shall be capable of being programmed as supervised reverse polarity notification circuits or supervised auxiliary power circuits that can be programmed as continuous, resettable or door holder power. The circuits shall also be programmable as input circuits in Class A or B configurations to support dry contact or compatible two wire smoke detectors.

The power module shall be capable of being connected via an RS-485 system bus (SBUS) at a maximum distance of 6,000 feet from the main control panel. It shall contain an additional RS-485 system bus that is completely compatible with all 6820 add-on SBUS modules, annunciators, serial/parallel modules and addressable devices. The power module will also act as a bus repeater so that additional RS-485 (modules) devices can be connected at a maximum distance of 6,000 feet from the power module.

The 5496 and 5895XL power modules must have 6 amps of output power and four circuits rated at 3 amps each. The four circuits can be programmed as notification outputs or auxiliary power outputs of door holder, constant, resettable and sounder base synchronization types.

The 6820 shall be able to support up to eight (8) of the Distributed Power Modules in any combination.

The power module's RS-485 bus shall be electrically isolated providing ground loop isolation and transient protection.

M. Digital Communicator

The digital/IP communicator must be an integral part of the control panel and be able to report all zones or points of alarm, supervisory, and trouble as well as all system status information such as loss of AC, low battery, ground fault, loss of supervision to any remote devices with individual and distinct numeric codes to a central station or remote station. The communicator must also be capable of up/downloading all system programming options, event history and detector sensitivity compliance information to a PC on-site through a USB or Ethernet cable. It shall transmit the information by one or more of the following means of communication – internet, cellular or standard telephone lines.

The communicator must be capable of reporting via SIA and Contact ID formats. The communicator shall have a delayed AC loss report function which will provide a programmable report delay plus a 10-25 min random component to help ease traffic to the central station during a power outage. No controls that use external modems for remote programming and diagnostics shall be accepted.

N. Dry Contacts

The FACP shall have three Form “C” dry contacts, one will be dedicated to trouble conditions, the other two will be programmable for alarm, trouble, supervisory, notification, pre-alarm, waterflow, manual pull, aux. 1 or aux. 2 conditions. The trouble contact shall be normal in an electrically energized state (fail-safe) so that any total power loss (AC and Backup) will cause a trouble condition. If the microprocessor on the FACP fails, the trouble contacts shall also indicate a trouble condition.

O. Ground Fault Detection

A ground fault detection circuit shall be employed which can detect a ground fault on both the positive and negative side of each circuit. The ground fault detector shall operate the general trouble devices as specified but shall not cause an alarm to be sounded. Ground faults shall not interfere with normal operation, such as alarm, or other trouble conditions.

P. Over Current Protection

All low voltage circuits will be protected by microprocessor controlled power limiting or have self-restoring polyswitches for the following: smoke detector power, main power supply, indicating appliance circuits, battery standby power and auxiliary output.

Q. Test Functions

1. A “Lamp Test” mode shall be a standard feature of the fire alarm control panel and shall test all LEDs and the LCD display on the main panel and remote annunciators.

2. A “Walk Test” mode shall be a standard feature of the fire alarm control panel. The walk test feature shall function so that each alarm input tested will operate the associated notification appliance for six seconds. The FACP will then automatically perform a reset and confirm normal device operation. The event memory shall contain the information on the point tested, the zone tripped, the zone restored, and the individual points return to normal.

3. A “Fire Drill” mode shall allow the manual testing of the fire alarm system notification circuits. The “Fire Drill” shall be capable of being controlled at the main annunciator, remote annunciators and via a remote contact input.

4. A “Disable Mode” shall allow for any zone, point, group, or NAC circuit to be disabled without affecting the operation of the total fire system.

R. Remote Input Capabilities

The control panel shall have provisions for supervised switch inputs for Alarm reset and Alarm and Trouble silence.

S. Notification Appliance Mapping Structure

All notification circuits and modules shall be programmable via a mapping structure that allows for a maximum of 999 output groups. Each of these groups shall be able to be triggered by any of the panels 999 zones. A group may be triggered from a zone individually, or may contain a global trigger for manual pull stations, fire drills and two different system alarms.

Each zone will individually control the cadence pattern of each of the groups that it is “Mapped” to so that sounders can indicate a variety of conditions. The zone shall able to issue a different cadence pattern for each of the groups under its control. The mapping structure must also allow a group to be designated to “ignore cadence” for use with strobes and other continuous input devices.

Zones shall have eight different output categories; Detector alarm, Trouble, Supervisory, Pre-alarm, Waterflow, Manual pull, Zone auxiliary one and Zone Auxiliary two. Each of the categories shall be able to control from 1 to 8 output groups with a cadence pattern. The patterns are; March code, ANSI 3.41, Single Stroke Bell Temporal, California code, Zone 1 coded, Zone 2 coded, Zone 3 coded, Zone 4 coded, Zone 5 coded, Zone 6 coded, Zone 7 coded, Zone 8 coded, Custom output pattern 1, Custom output pattern 2, Custom output pattern 3, Custom output pattern 4 and Constant.

Each NAC circuit can also be configured to produce one of four synchronization patterns: AMSECO synchronization, Gentex synchronization, System Sensor synchronization, and Wheelock synchronization. This mapping/cadence pattern shall be supported by all system power supplies and Notification Expander Modules. This mapping/cadence pattern shall be supported by all system power supplies and Notification Expander Modules.
In addition, synchronization is built-in for Amseco®, Gentex®, System Sensor®, and Wheelock® devices. This mapping/cadence pattern shall be supported by all system power supplies and Notification Expander Modules.

T. Downloading Software

The fire alarm control panel must support up/downloading of system programming from a PC under Windows or NT environments. The FACP must also be able to upload the detector sensitivity test results and a 1,000-event system event buffer to the PC.

Communication shall take place over a direct connection to the PC through a USB or Ethernet cable and shall not require an external modem to be connected to the panel. The downloading software shall contain a code that will block unauthorized persons from accessing the panel via direct connection or ethernet.

U. English Language Descriptions

The FACP shall provide the ability to have a text description of each system device input zone and output group on the system. The use of individual lights to provide descriptions will not be acceptable.

2.2 SYSTEM OPERATION

A. Alarm

When a device indicates any alarm condition the control panel must respond within 10 seconds. The General Alarm or Supervisory Alarm LED on the annunciator(s) should light and the LCD should prompt the user as to the number of current events. The alarm information must be stored in event memory for later review. Event memory must be available at the main and all remote annunciators.

When the alarmed device is restored to normal, the control panel shall be required to be manually reset to clear the alarm condition, except that the alarms may be silenced as programmed.

An alarm shall be silenced by a code at the main or remote annunciators. When silenced, this shall not prevent the resounding of subsequent events if another event should occur (subsequent alarm feature). When alarms are silenced the silenced LED on the control panel, and on any remote annunciators shall remain lit, until the alarmed device is returned to normal.

B. Troubles

When a device indicates a trouble condition, the control panel System Trouble LED should light and the LCD should prompt the user as to the number of current events. The trouble information must be stored in event memory for later review. Event memory must be available at the main and all remote annunciators.

When the device in trouble is restored to normal, the control panel shall be automatically reset. The trouble restore information must be stored in event memory for later review. Event memory must be available at the main and all remote annunciators. A trouble shall be silenced by pressing Silence at the main panel or a code or Firefighter key at the remote annunciators. When silenced, this shall not prevent the resounding of subsequent events if another event should occur.

C. Supervision methods

Each SLC loop shall be electrically supervised for opens and ground faults in the circuit wiring, and shall be so arranged that a fault condition on any loop will not cause an alarm to sound. Additionally, every addressable device connected to the SLC will be supervised and individually identified if in a fault condition. The occurrence of any fault will light a trouble LED and sound the system trouble sounder, but will not interfere with the proper operation of any circuit which does not have a fault condition.

Each indicating appliance circuit shall be electrically supervised for opens, grounds and short circuit faults, on the circuit wiring, and shall be so arranged that a fault condition on any indicating appliance circuit or group of circuits will not cause an alarm to sound. The occurrence of any fault will light the trouble LED and sound the system trouble sounder, but will not interfere with the proper operation of any circuit which does not have a fault condition.

2.3 SYSTEM CABINET

A. Mounting

The system cabinet shall be red and can be either surface or flush mounted. The cabinet door shall be easily removable to facilitate installation and service.

B. Audible System Trouble Sounder

An audible system trouble sounder shall be an integral part of the control unit. Provisions shall also be provided for an optional supervised remote trouble signal.

C. Power Supply and Charger:

The entire system shall operate on 24 VDC, filtered switch mode power supply with the rated current available of 6 amps. The FACP must have a battery charging circuit capable of complying with the following requirements:

Twenty-four (24) hours of battery standby with five (5) minutes of alarm signaling at the end of this twenty-four (24) hour period (as required per NFPA 72 central station signaling requirements) using rechargeable batteries with automatic charger to maintain gel-cell batteries in a fully charged condition.

The power supply shall comply with UL Standard 864 for power limiting.

The FACP will indicate a trouble condition if there is a loss of AC power or if the batteries are missing or of insufficient capacity to support proper system operation in the event of AC failure. A “Battery Test” will be performed automatically every minute to check the integrity of the batteries. The test must disconnect the batteries from the charging circuit and place a load on the battery to verify the battery condition.

If it is necessary to provide additional power one or more of the model 5496 or 5895XL distributed power modules shall be used to accomplish this purpose.

D. Connections and Circuits

Connections to the light and power service shall be on a dedicated branch circuit in accordance with the National Electrical Code (NEC) and the local authority having jurisdiction (AHJ).

The circuit and connections shall be mechanically protected.
A circuit disconnecting means shall be accessible only to authorized personnel and shall be clearly marked “FIRE ALARM CIRCUIT CONTROL”.

2.4 THE FACP SHALL SUPPORT A THE FOLLOWING DEVICES ON THE RS-485 DATA BUS:

6815	Signaling Line Circuit Expander (SLC) Module
6860	LCD Remote Annunciator
6855	LCD Remote Annunciator
5860	LCD Remote Annunciator
5824	Printer Interface Module
5865-3	LED Remote Annunciator
5865-4	LED Remote Annunciator with reset and silence switches
5880	LED I/O module
5883	Relay Interface Board

5895XL	Intelligent Distributed Power Module
5496	Intelligent Remote Power Supply 6.0 Amp
SK-NIC	Network Interface Card
SK-NIC-KIT	Installation Accessory Kit
SK-FML	Fiber Module, Multi-Mode
SK-FSL	Fiber Module, Single-Mode

2.5 THE FACP SHALL SUPPORT THE OPERATION OF 159 TOTAL DEVICES PER SLC LOOP WITHOUT REGARD TO DEVICE TYPE. THE FOLLOWING DEVICES SHALL BE SUPPORTED:

SK-PHOTO	Addressable Photoelectric Smoke detector
SK-PHOTO-T	Addressable Photoelectric Smoke detector with Thermal
SK-PHOTOR	Addressable Photoelectric Smoke detector with Relay
SK-FIRE-CO	Addressable Combination Photoelectric and CO Detector
SK-HEAT	Addressable Heat Sensor
SK-HEAT-ROR	Addressable Heat with Rate of Rise
SK-HEAT-HT	Addressable Heat High temp 190°
SK-ACCLIMATE	Addressable Multi Criteria Smoke detector with thermal
SK-6AB	6” detector base
SK-DUCT	Addressable Duct Detector Housing
SK-RELAY	Addressable Relay Module
SK-RELAY-6	Addressable Multi Relay Module
SK-RELAYMON-2	Addressable Relay/Input Module
SK-MONITOR	Addressable Input Module (Class A or B)
SK-MINIMON	Mini Input Module
SK-MONITOR-2	Addressable Dual Input Module
SK-MON-10	Addressable Multi Input Module (10)
SK-CONTROL	Addressable Notification Module
` SK-CONTROL-6	Addressable Notification Multi Module (6)
SK-ZONE	Two Wire Smoke Detector Module
SK-ZONE-6	6 Multi Smoke Detector Module
SK-ISO	Isolation Module
SK-BEAM	Addressable Beam Detector
SK-BEAM-T	Addressable Beam Detector with Test feature
B224BI	Addressable Isolator base
B224RB	Detector Relay Base
B200S	Intelligent Detector Synchronized Sounder Base
B200S-LF	Intelligent Detector Low Frequency Synchronized Sounder Base
B200SR	Intelligent Detector Sounder Base
B200SR-LF	Intelligent Detector Low Frequency Sounder Base
RTS151KEY	Remote Test Switch for Photoelectric Duct Detector
RTS151	Remote Test Switch for Photoelectric Duct Detector
SK-Pull-SA	Addressable Single Action Pull Station
SK-Pull-DA	Addressable Dual Action Pull Station

The FACP shall support these other Honeywell devices via addressable input, addressable notification, or addressable output modules.

PS-SATK	Single Action Pull Station – Key Reset
PS-DATK	Double Action Pull Station – Key Reset

2.6 MANUAL FIRE ALARM STATIONS

Manual fire alarm stations shall be non-coded, break glass, single or double action type, with a key operated test-reset lock in order that they may be tested, and so designed that after actual emergency operation, they cannot be restored to normal except by use of a key. The reset key shall be so designed that it will reset manual station and open FACP without use of another key. An operated station shall automatically condition itself to be visually detected, as operated, at a minimum distance of fifty feet, front or side. Manual stations shall be constructed of die cast metal or polycarbonate with clearly visible operating instructions on the front of the stations in raised letters.

Stations shall be suitable for surface mounting on matching back box, or semi-flush mounting on a standard single-gang box, and shall be installed within the limits defined by the Americans with Disabilities Act (ADA) dependent on manual station accessibility or per local requirements.

If using conventional pull stations, they must be installed in conjunction with an Addressable Input Module (SK-Monitor) or Mini Input Module (SK-Minimon). Manual stations shall be Silent Knight Model PS-DATK, PS-SATK, and Honeywell Underwriters Laboratories listed when used with addressable modules.

2.7 REMOTE POWER SUPPLIES

The remote power supplies for notification appliances shall be models 5496 and/or 5895XL. The intelligent power supply shall wire on the main SBUS and be programmed through the 6820 panel. The 5496 will support 6 amps of 24-volt DC power, with 6 Flexput circuits, rated at 3 amps each. The 5895XL will support 6 amps of 24-volt DC power, with 6 Flexput circuits, rated at 3amps each. The 5895XL power supply will also regenerate the S-Bus for an additional 6000 feet.

The 5496 intelligent power supply shall wire on the main SBUS and be programmed through the 6820. It will support 6 amps of 24-volt DC power with 4 notification circuits, rated at 3 amps each.

The remote power supply model 5499 or 5495 may also be used on the system. These power supplies are activated by notification circuit or the SK-CONTROL module and support 24VDC power, with 4 notification circuits, rated at 3 amps each. The total power on a 5495 is 6 amps. The total power on a 5499 is 9 amps. These power boosters may also be activated from another notification circuit from either the fire alarm control, or a distributed power supply.

2.8 NOTIFICATION DEVICES

The visual and audio/visual signaling devices shall be compatible with the 6820, 5495, 5496, 5499, or 5895XL as stated in the installation manuals and be listed with Underwriters Laboratories Inc. per UL 1971 and/or 1638. Each indicating appliance circuit shall be electrically supervised for opens, grounds and short circuit faults, on the circuit wiring, and shall be so arranged that a fault condition on any indicating appliance circuit or group of circuits will not cause an alarm to sound. The occurrence of any fault will light the trouble LED and sound the system trouble sounder, but will not interfere with the proper operation of any circuit which does not have a fault condition.

The notification appliance (combination audio/visual units only) shall produce a peak sound output of 90dba or greater as measured in an anechoic chamber. The appliance shall be able to meet the candela requirements of the blueprints presented by the Engineer and ADA. The appliance shall be polarized to allow for electrical supervision of the system wiring.

The unit shall be provided with terminals with barriers for input/output wiring and be able to mount a single gang or double gang box or double workbox with the use of an adapter plate. The unit

shall have an input voltage range of 19-30 volts. Devices that meet these requirements can be found at www.systemsensor.com, or equivalent.

2.9 SMOKE DETECTORS

Smoke detectors shall be Honeywell Silent Knight Model SK-PHOTO, ceiling mounted, analog/addressable photoelectric smoke detector, SK-Acclimate multi-criteria photoelectric smoke detector, or the SK-FIRE-CO multi-criteria ceiling mounted fire and carbon monoxide detector. The combination detector head and twist lock base shall be U.L. listed compatible with the Honeywell Silent Knight 6820 fire alarm control panel. The base shall permit direct interchange with the Honeywell Silent Knight SK-ACCLIMATE and SK-HEAT detectors. The base shall be the appropriate twist lock base B210LP.

The smoke detector shall have a flashing status LED for visual supervision. When the detector is actuated, the flashing LED will latch on steady at full brilliance. The detector may be reset by actuating the control panel's reset switch. The sensitivity of the detector shall be capable of being selected and measured by the control panel without the need for external test equipment. The vandal security-locking feature shall be used in those areas as indicated on the drawing.

The locking feature shall be field selectable when required. It shall be possible to perform a sensitivity test of the detector without the need of generating smoke. The test method shall simulate the effects of products of combustion in the chamber to ensure testing of the detector circuits.

Detectors shall have completely closed back to restrict entry of dust and air turbulence and have a 30-mesh insect screen. Electronics of the unit shall be shielded to protect against false alarms from E.M.I. and R.F.I.

2.10 HEAT DETECTORS

Furnish and install analog/addressable heat detectors, Honeywell model SK-HEAT. The combination heat detector and twist lock base shall be U.L. listed compatible with the Honeywell 6820 fire alarm control panel. The base shall permit direct interchange with the Honeywell Silent Knight SK-PHOTO, or SK-ACCLIMATE detectors. The base shall be the appropriate twist lock base B210LP.

The heat detector shall have a flashing status LED for visual supervision. When the detector is actuated, the flashing LED will latch on steady at full brilliance. The detector may be reset by actuating the control panel's reset switch. The vandal security-locking feature shall be used in those areas as indicated on the drawings. Electronics of the unit shall be shielded to protect against false alarms from E.M.I. and R.F.I.

2.11 DUCT DETECTORS

Duct Detector shall be Honeywell Silent Knight Series Model DNR Duct Detector Housing. A separate SK-PHOTO or SK-PHOTOR is required. The duct detector housing shall be able to house the SK-RELAY module for optional output devices.

2.12 LOW FREQUENCY NOTIFICATION APPLIANCES

Provide low frequency notification appliances in all sleep areas and common living areas of the fire station. Sounders shall be UL Listed under Standard 464 to meet the NFPA 72 (Fire) and NFPA 720 (CO Life Safety) requirements for sleeping rooms. Selectable Tones (Temporal 3, Temporal 4, or Continuous), capable of synchronized coded output from fire alarm control panel (FACP) notification appliance circuit when set to "Continuous".

PART 3 - EXECUTION

3.1 INSTALLER'S RESPONSIBILITIES

Per California codes all individuals involved in the installation of the fire alarm system shall hold a valid State of California, Division of Apprenticeship Standards (DAS), Fire/Life Safety Technician Certification.

The installer shall coordinate the installation of the fire alarm equipment. All conductors and wiring shall be installed according to the manufacturer's recommendations.

It shall be the installer's responsibility to coordinate with the supplier, regarding the correct wiring procedures before installing any conduits or conductors.

All start-up programming and system commissioning shall be performed by a Silent Knight trained and certified technician.

Provide the NFPA certificate to the Owner, local Fire Marshal, and Architect.

Instruction shall be provided as required for operating the system. Hands-on demonstrations of the operation of all system components and the entire system including program changes and functions shall be provided to the Fire Department's satisfaction.

The contractor and/or the systems manufacturer's representatives shall provide a typewritten "Sequence of Operation."

3.2 INSTALLATION OF SYSTEM COMPONENTS

System components shall be installed in accordance with the latest revisions of the appropriate NFPA pamphlets, the requirements contained herein, National Electrical Code, local and state regulations, the requirements of the fire department and other applicable authorities having jurisdiction (AHJ).

All wire used on the fire alarm system shall be U.L. Listed as fire alarm protection signaling circuit cable per California Electrical Code, Articles 760.

3.3 WARRANTY AND FINAL TEST

A. General

The contractor shall warrant all equipment and wiring free from inherent mechanical and electrical defects for one year (365 days) from the date of final acceptance.

B. Final Test

Before the installation shall be considered completed and acceptable by the awarding authority, a test of the system shall be performed as follows:

1. The contractor's job foreman, a representative of the owner, Inspector of Record (IOR), and the fire department shall operate every building fire alarm device to ensure proper operation and correct annunciation at the control panel.

2. At least one half of all tests shall be performed on battery standby power.

3. Where application of heat would destroy any detector, it may be manually activated.

4. The communication loops and the indicating appliance circuits shall be opened in at least two (2) locations per circuit to check for the presence of correct supervision circuitry.

5. When the testing has been completed to the satisfaction of both the contractor's job foreman and owner, a notarized letter cosigned by each attesting to the satisfactory completion of said testing shall be forwarded to the owner and the fire department.

6. The contractor shall leave the fire alarm system in proper working order, and, without additional expense to the owner, shall replace any defective materials or equipment provided by him under this contract within one year (365 days) from the date of final acceptance by the awarding authority.

7. Prior to final test the fire department must be notified in accordance with local requirements.

3.4 AS BUILT DRAWINGS, TESTING, AND MAINTENANCE INSTRUCTIONS

A. As Built Drawings

A complete set of reproducible "as-built" drawings showing installed wiring, color coding, and wire tag notations for exact locations of all installed equipment, specific interconnections between all equipment, and internal wiring of the equipment shall be delivered to the owner upon completion of system.

B. Operating and Instruction Manuals

Operating and instruction manuals shall be submitted prior to testing of the system. Three (3) complete sets of operating and instruction manuals shall be delivered to the owner upon completion. User operating instructions shall be provided prominently displayed on a separate sheet located next to the control unit in accordance with U.L. Standard 864.

END OF SECTION

SECTION 31 00 00 EARTHWORK

PART 1 - GENERAL

1.1 INCLUSION OF OTHER CONTRACT DOCUMENTS

A. The General Conditions, Supplementary Conditions and Division 1 are fully applicable to this Section, as if repeated herein.

1.2 SECTION INCLUDES

A. Section 01 5000, Temporary Facilities and Controls.

B. Section 01 513, Erosion Control.

C. Section 31 2333, Trenching and Backfilling.

D. Section 32 1200, Asphalt Concrete Paving.

E. Section 32 1600, Site Concrete.

F. Section 32 8000, Irrigation.

G. Section 32 9000, Landscaping.

H. Section 33 4000, Storm Drainage Utilities.

1.3 QUALITY ASSURANCE

A. Use only new materials and products, unless existing materials or products are specifically shown otherwise on the Drawings to be salvaged and re-used.

B. All materials, components, assemblies, workmanship and installation are to be observed by the Owner's Inspector of Record. Work not so inspected is subject to uncovering and replacement.

C. The representatives of the Owner's testing lab will not act as supervisor of construction, nor will they direct construction operations. Neither the presence of the Owner's testing lab representatives nor the testing by the Owner's testing lab shall excuse the contractors or subcontractors for defects discovered in their work during or following completion of the project. Correcting of inadequate compaction or moisture content is the sole responsibility of the contractor.

D. Testing: See Part 3 for Compaction Testing.

E. Contractor shall be solely responsible for all subgrades built. Failures resulting from inadequate compaction or moisture content are the responsibility of the contractor. Contractor shall be solely responsible for any and all repairs.

1.4 SUBMITTALS

A. Refer to Section 01 3300.

B. Manufacturer's Data: Submit list and complete descriptive data of all products proposed for use. Include manufacturer's specifications, published warranty or guarantee, installation instructions, and maintenance instructions.

1.5 GUARANTEE

A. Refer to General Conditions and Section 01 3300.

1.6 REFERENCE AND STANDARDS

A. California Building Code (CBC), edition as noted on the drawings.

B. California Green Building Standards Code, edition as noted on the drawings.

C. General: Site survey, included in the drawings, was performed by MCR Engineering, Inc. dated November 2023, and is the basis for data regarding current conditions. While the survey is deemed generally accurate, there exists discrepancies and variations due to elapsed time, weather, etc. Existing dirt grades may vary 0.2 ft. from that shown.

D. Geotechnical Engineering Report was prepared by Geocon Consultants, Inc. dated September 2023. Report is entitled Coastside Fire Protection District Coastside Fire Station No. 44 Replacement, and is on file with Architect. Soils information is taken from this Report. Contractor is responsible for any conclusions drawn from this data; should he prefer not to assume such risk he is under obligation to employ his own experts to analyze available information and/or to make additional explorations, at no cost to Owner, upon which to base his conclusions. Neither Owner, Soils Engineer nor Architect guarantees information will be continuous over entire site of work.

E. Site Visitation: All bidders interfacing with existing conditions shall visit the site prior to bid to verify general conditions of improvements. Discrepancies must be reported prior to the bid for clarification.

F. ANSI/ASTM D698-00 - Test Methods for Moisture-Density Relations of Soils and Soil-Aggregate Mixtures, Using 5.5 lb (2.49 Kg) Rammer and 12 inch (304.8 mm) Drop.

G. ANSI/ASTM D1556-00 - Test Method for Density of Soil in Place by the Sand-Cone Method.

H. ANSI/ASTM D1557-02e2 - Test Methods for Moisture-Density Relations of Soils and Soil-Aggregate Mixtures Using 10 lb. (4.54 Kg) Rammer and 18 inch (457 mm) Drop.

I. ANSI/ASTM D 3017-05 Test Methods for Moisture Content of Soils and Soil-Aggregate Mixture by Nuclear Methods (Shallow Depth).

J. ANSI/ASTM D 422-63(2007) e1 Test Method for Particle Size Analysis of Soil.

K. ANSI/ASTM D 4318-05 Test Method for Liquid Limit, Plastic Limit, and Plasticity Limit.

L. CALTRANS Standard Specifications Section 17.

M. CAL-OSHA, Title 8, Section 1590 (e).

N. Any work within the street, highway or right-of-way shall be performed in accordance with the requirement of the governmental agencies having jurisdiction and shall not begin until all those governing authorities have been notified.

1.7 DELIVERY, STORAGE AND HANDLING

A. Transport, store, and handling in strict accord with the local jurisdiction.

B. Make delivery to job when notified by Contractor verifying that the job is ready to receive the work of this Section and that arrangements have been made to properly store, handle, and protect such materials and work.

1.8 PROJECT CONDITIONS

A. Existing civil, mechanical, and electrical improvements are shown on respective site plans to the extent known. Should the Contractor encounter any deviation between actual conditions and those shown, he is to immediately notify the Architect before continuing work.

B. Excavation dewatering may be necessary. The contractor shall provide all tools, equipment and labor necessary for excavation dewatering no matter what the source. Dewatering shall be continuous until all site utilities are installed and backfilled. The contractor shall obtain all necessary permits for dewatering operations, including surface discharge.

1.9 EXISTING SITE CONDITIONS

A. The contractor shall acquaint himself with all site conditions. If unknown active utilities are encountered during work, notify Architect promptly for instructions. Failure to notify will make Contractor liable for damage to these utilities arising from Contractor's operations subsequent to discovery of such unknown active utilities.

1.10 ON SITE UTILITY VERIFICATION REPAIR PROCEDURES

A. Ground-breaking requirements:

1. All underground work performed by a Contractor must be authorized by the County's Construction Manager or the Low Voltage Consultant prior to start of construction.

2. The Contractor is to obtain and keep the original County's construction utility site plans on site during all excavation operations. Contractors can contact the County's Construction Manager, Facilities Manager, or the Low Voltage Consultant to procure the drawings.

B. Ground-breaking requirements:

1. The contractor shall hire an Underground Utility Locating Service to locate existing underground utility pathways in areas affected by the scope of work for excavation.

2. Contractor must use an underground utility locator service with a minimum of 3 years of experience. The equipment operator must have demonstrated experience.

3. The Underground Utility Locator Service must have the use of equipment with the ability to locate by means of inductive clamping, induction, inductive metal detection, conductive coupling, or TransOnde (Radiodetection) to generate signals, passive locating (free scoping) for "hot" electric, and metal detector.

4. The Underground Utility Locator Service must be able to locate existing utilities at a depth of at least 72".

5. The Underground Utility Locator Service must be able to locate but are not limited to locating the following types of utility pathways:

   a. All conduit pathways containing 110 volt or greater 50-60Hz electrical wire.

   b. All conduit pathways containing an active cable TV system.

   c. All conduit pathways containing wire or conductor in which a signal can be attached and generated without damaging or triggering the existing systems.

   d. All empty conduit pathways or pipes in which a signal probe or sonde (miniature transmitter) can be inserted.

   e. All conduit pathways containing non-conductive cables or wires in which a signal probe or sonde (miniature transmitter) can be inserted.

   f. All plastic and other nonconductive water lines in which a TransOnde Radiodetection or other "transmitter" can be applied to create a low frequency pressure waive (signal) without damaging or triggering the existing systems.

   g. All copper or steel waterlines and plastic or steel gas lines.

1.11 PROTECTION

A. Adequate protection measures shall be provided to protect workmen and passers-by on and off the site. Adjacent property shall be fully protected throughout the operations. Blasting will not be permitted. Prevent damage to adjoining improvements and properties both above and below grade. Restore such improvements to original condition should damage occur. Replace trees and shrubs outside building area disturbed by operations.

B. In accordance with generally accepted construction practices, the Contractor shall be solely and completely responsible for working conditions at the job site, including safety of all persons and property during performance of the work. This requirement shall apply continuously and shall not be limited to normal working hours.

C. Any construction review of the Contractor's performance conducted by the Geotechnical Engineer is not intended to include review of the adequacy of the Contractor's safety measures, in, on, or near the construction site.

D. Provide shoring, sheeting, sheet piles and or bracing to prevent caving, erosion or gullying of sides of excavation.

E. Surface Drainage: Provide for surface drainage during period of construction in manner to avoid creating nuisance to adjacent areas. The contractor shall make a reasonable

effort on a daily basis to keep all excavations and the site free from water during the entire progress of work, regardless of cause, source, or nature of water.

F. Adjacent streets and sidewalks shall be kept free of mud, dirt or similar nuisances resulting from earthwork operations.

G. The site and adjacent influenced areas shall be watered as required to suppress dust nuisance. Dust control measures shall be in accordance with the local jurisdiction.

H. Trees: Carefully protect existing trees that are to remain. Provide temporary irrigation as necessary to maintain the health of trees.

I. Environmental Protection:

1. No ground-disturbing activities shall be allowed outside of the project construction boundary. Construction fencing shall be placed at the boundary of the project site to clearly mark the limits of ground-disturbing activities.

2. All project-related traffic shall be restricted to designated access roads, routes, and construction areas within the project boundary. No vehicular or pedestrian traffic shall be allowed outside the designated project boundary.

3. To prevent sediment, hazardous materials, and other pollutants from washing or running off into the vernal swale and vernal pools outside of the project site, the contractor shall implement best management practices (BMP) as identified in a Storm Water Pollution Prevention Plan (SWPPP), which is to be prepared by the contractor.

4. Dirt roadways or other areas of disturbed bare ground within 100 feet of elderberry shrubs will be watered at least twice a day to minimize dust emissions.

5. Contractor to avoid and protect all protected species.

1.12 SEASONAL LIMITS

A. No fill material shall be placed, spread, or rolled during unfavorable weather conditions. When work is interrupted by rains, fill operations shall not be resumed until field tests indicate that moisture content and density of fill are satisfactory.

B. Excessively wet fill material shall be bladed and aerated per section 3.8, B.

1.13 TESTING

A. Geotechnical Engineer: Owner is retaining a Geotechnical Engineer to determine compliance of fill with Specifications, and to direct adjustments in fill operations. Costs of Geotechnical Engineer will be borne by Owner; except those costs incurred for re-tests or re-inspection will be paid by Owner and back charged to the contractor.

1. If Contractor elects to process or mine onsite materials for use as Suitable Fill, Aggregate Sub Base, Aggregate Base, Rock, Crushed Rock or sand the cost of all testing of this material shall be paid for by the Contractor.

2. Testing of import fill for compliance with the project soils report and County

requirements. All testing of imported fill material for compliance with state, county, and County requirements shall be paid for by the contractor and included in the project bid.

PART 2 PRODUCTS

2.1 MATERIALS

A. Engineered Fill Materials: All fill shall be of approved local materials supplemented by imported fill if necessary. "Approved" local materials are defined as local soils tested and approved by Geotechnical Engineer free from debris, and concentrations of clay and organics; and contain rocks no larger than 2-inches in greatest dimension. The soil and rock should be thoroughly blended so that all rock is surrounded by soil. This may require mixing of the soil and rock with a dozer prior to placement and compaction. Clods, rocks, hard lumps or cobbles exceeding 1-inches in final size shall not be allowed in the upper 6 inches of any fill. Native clay or clayey soils will not be permitted within building pad areas or paved areas, or as outlined by the project soils report.

B. Proposed import fill material shall meet the above requirements, have a Plasticity Index of 15 or less when tested in accordance with ASTM D4318, and have a minimum Resistance value of at least 15 when tested in accordance with California Test 301 (or as defined in the Geotechnical Report); shall be similar to the native soils. Import fill shall meet the above requirements; be free of particles greater than two-inches (2") in largest dimension; be free of contaminants and have corrosion characteristics within the acceptable limits. All import fill material shall be tested and approved by Soils Engineer prior to transportation to the site.

1. Reports/Documentation

a. Results of the testing analysis shall be sent to the Owner; Architect; Project Inspector, Project Civil Engineer,

C. Excessively wet fill material shall be bladed and aerated per section 3.8, B.

1. The top 4" of native topsoil stripped from the site may be used for landscape backfill material provided it meets the requirements as specified in Section 32 9000 Landscaping.

2. Imported Topsoil may be required to complete work. See Section 32 9000 Landscaping for requirements.

D. Water: Furnish all required water for construction purposes, including compaction and dust control. Water shall be potable.

E. Aggregate Base: Provide Class 2, 3/4" Aggregate Base conforming to standard gradation as specified in Cal Trans Standard Specifications, Section 26,-1.02A.

F. Decomposed Granite: Decomposed Granite shall be a well graded mixture of fine to 1/8" particles in size with no clods. The material shall be free of vegetation, other soils, debris, and rock. The material shall be reddish tan to tan in color.

G. Decomposed Granite Solidifier: PolyPavement or equal.

PART 3 - EXECUTION

3.1 INSPECTION LAYOUT AND PREPARATION

A. Prior to installation of the work of this Section, carefully inspect and verify by field measurements that installed work of all other trades is complete to the point where this installation may properly commence

B. Layout all work, establish grades, locate existing underground utilities, set markers and stakes, setup and maintain barricades and protection facilities; all prior to beginning actual earthwork operations. The layout and staking shall be done by a Professional Land Surveyor or Registered Civil Engineer licensed to perform land surveying.

C. Verify that specified items may be installed in accordance with the approved design.

D. In event of discrepancy, immediately notify Owner and the Architect. Do not proceed in discrepant areas until discrepancies have been fully resolved.

3.2 PERFORMANCE

A. GENERAL:

1. General: Do all grading, excavating, and cutting necessary to conform finish grade and contours as shown. All cuts shall be made to true surface of subgrade.

2. Archaeological Artifacts: Should any artifacts of possible historic interest be encountered during earthwork operations, halt all work in the area of discovery and immediately contact the Architect for notification of appropriate authorities.

3. Degree of Compaction: Percentage of maximum density, hereinafter specified as degree of compaction required, means density equivalent to that percentage of maximum dry density determined by ASTM D1557 Compaction Test method, and such expressed percentage thereof will be minimum acceptable compaction for specified work.

4. Moisture Content: Moisture content will be determined by the Soils Engineer and this information supplied to Contractor. Optimum moisture content shall be maintained until subgrade is covered by surfacing materials.

3.3 DEMOLITION, DISPOSAL AND DISPOSITION OF UNDESIRABLE MAN-MADE FEATURES

A. All other obstructions, such as abandoned utility lines, septic tanks, concrete foundations, and the like

3.4 TESTING AND OBSERVATION

A. All grading and earthwork operations shall be observed by the Geotechnical Engineer or his representative, serving as the representative of the Owner.

B. Field compaction tests shall be made by the Geotechnical Engineer or his representative. If moisture content and/or compaction are not satisfactory, Contractor will be required to change equipment or procedure or both, as required to obtain specified moisture or compaction. Notify Geotechnical Engineer at least 48 hours in advance of any filling operation.

C. Earthwork shall not be performed without the notification or approval of the Geotechnical Engineer or his representative. The Contractor shall notify the

Geotechnical Engineer at least two (2) working days prior to commencement of any aspect of the site earthwork.

D. If the Contractor should fail to meet the compaction or design requirements embodied in this document and on the applicable plans, he shall make the necessary readjustments until all work is deemed satisfactory, as determined by the Geotechnical Engineer or Architect/Engineer.

E. After each rain event Geotechnical Engineer shall test fill material for optimum moisture. Do not place any fill material until desired moisture is achieved.

3.5 CLEARING AND GRUBBING

A. Prior to grading, remove all debris off-site. Remove trees and brush including the root systems. Holes resulting from tree and brush removal should be prepared and backfilled in accordance with paragraphs 3.7, 3.8, 3.9, and 3.10. This may require deepening and/or widening the holes to adequately remove disturbed soil and provide room for compaction equipment. Strip the surface of all organics. Stripped material meeting the requirements of Section 32 9000 may be used in landscape areas only.

3.6 CUTTING

A. Building pads that are located within a cut/fill transition area will have to be over excavated to provide a semi-uniform fill beneath the building pad. The portions of building pads located in cut areas shall be over excavated to provide no more than 12 inches difference in fill placed in the same building pad, or as shown in the geotechnical report.

B. Do all cutting necessary to bring finish grade to elevations shown on Drawings.

C. When excavation through roots is necessary, cut roots by hand.

D. Carefully excavate around existing utilities to avoid unnecessary damage. The contractor shall anticipate and perform handwork near existing utilities as shown on the survey, without additional claims or cost.

3.7 STRUCTURAL EXCAVATION

A. General: Excavate to bear on firm material at contract depth shown on Structural Drawings.

B. Footings: All footing excavations shall be of sufficient width for installation of formwork unless earth retains its position during concreting. All portions of footings above grade must be formed. If footings are placed against earth, footing widths below grade shall be increased 2 inches from those shown on Drawings and positive protection shall be provided for top corners of trench, or as directed by the structural engineer.

C. Unsuitable Ground: Any errors in structural excavation, soft ground, or clay soils found when excavating shall be reported to Architect. In no case shall work be built on any such soft or clayey unsuitable surface without direction from the Soils Engineer. Restore excavations to proper elevation with engineered fill material compacted to 95% of dry density.

3.8 SUBGRADE PREPARATION

A. Grade compact and finish all subgrades within a tolerance of 0.05' of grades as indicated on Drawings and so as not to pool water. Subgrade within building pads and concrete walks shall be within 0.05' of grades indicated.

B. After clearing, grubbing and cutting, subsurface shall be scarified to a depth of at least 12", until surface is free from ruts, hummocks or other uneven features. Moisture condition to optimum moisture content and recompact to at least 95% of the maximum dry density as determined by ASTM Test Method D1557. If the existing soils are at a water content higher than specified, the contractor shall provide multiple daily aerations by ripping, blading, and/or discing to dry the soils to a moisture content where the specified degree of compaction can be achieved. After seven consecutive working days of daily aerations, and the moisture content of the soil remains higher than specified, the contractor shall notify the architect. If the existing soils have a moisture content lower than specified, the contractor shall scarify, rip, water and blade existing soil to achieve specified moisture content. The contractor shall make proper allowance in schedule and methods to complete this work. Fill shall be placed in 6” maximum lifts.

C. After subgrade for fill within building pad area or within paved areas has been cleared, plowed and scarified, it shall be disked or bladed until uniform and free from large clods, brought to optimum moisture content and compacted to not less than 95% of maximum dry density, as determined by ASTM Test Method D1557, and such expressed percentage thereof will be minimum acceptable density for specified work.

D. Subgrade in areas to receive landscaping shall be compacted to (90%).

E. Where Contractor over-excavates building pads through error, resulting excavation shall be recompacted as engineered fill at Contractor's expense.

F. In building pad areas with cut/fill transitions or building pad areas, which are entirely in cut , overexcavate a minimum of 2 feet so that differential fill thickness does not exceed 1 foot over a horizontal distance of 5 feet, or as directed by the soils report or Geotechnical Engineer.

3.9 PLACING, SPREADING AND COMPACTING FILL MATERIAL IN BUILDING PAD AND PAVEMENT AREAS

A. Selected fill material shall be placed in layers which, when compacted, shall not exceed 6 inches in compacted thickness. Each layer shall be spread evenly and thoroughly mixed to insure uniformity in moisture content. Compaction of rocky fill materials should be achieved by at least successive passes with a compactor or an equivalent self-propelled sheepsfoot compactor. Compactive effort should be applied uniformly across the full width of the fill. Large rocks that cannot be properly incorporated into the engineered fill should be removed.

B. Selected fill material shall be moisture-conditioned to specified moisture content. Selected fill material shall be unfrozen. When moisture content of fill material is below that specified, add water until proper moisture content is achieved. When moisture content is above that specified, aerate by blading or other methods mentioned in 3.08 B until moisture content is satisfactory.

C. After each layer has been placed, mixed and spread evenly, it shall be thoroughly compacted to a minimum of 95% as determined by the ASTM D1557 Compaction Test. Compact each layer over its entire area until desired density has been obtained.

D. Recompaction of Fill in Trenches and Compaction of Fill Adjacent to Walls: Where trenches must be excavated, backfill with material excavated. Place in lifts that when compacted do not exceed 6", moisture conditioned to optimum moisture content, and compact to a minimum of 95% relative compaction in building pad and paved areas, and to 90% relative compaction in landscape areas.

E. Jetting of fill materials will not be allowed.

3.10 FINAL SUBGRADE COMPACTION

A. Building Pads: Compaction of engineered fill, overexcavation or existing material shall be in accordance with the project soils report.

B. Paved Areas: Upper 6" of all final subgrades supporting pavement sections and all other flatwork shall be brought to specified moisture content and shall be uniformly compacted to not less than 95% of maximum dry density, regardless of whether final subgrade elevation is attained by filling, excavation, or is left at existing grade. After acceptance of final compaction test, contractor shall maintain the required moisture content of subgrade until concrete flatwork is placed.

C. Other Fill and Backfill: Upper 6" of all other final subgrades or finish grades shall be compacted to
90% of maximum dry density.

D. Gravel Fill or Aggregate Base: Do not place compacted gravel fill until after underground work and foundations are in place. Compact gravel fill with vibratory plate or similar equipment to preclude settlement.

3.11 PLACING, SPREADING, AND COMPACTION OF LANDSCAPE BACKFILL MATERIALS

A. Paved Areas: Upper All landscaped areas shall receive topsoil. After subgrade under landscape area has been scarified and brought to 90% maximum dry density, top soil shall be placed evenly to depth of 6" at 85% of maximum dry density.

B. Project Inspector must verify that materials are uniformly spread to minimum depth specified.

3.12 SLOPE CONSTRUCTION

A. Cut slopes shall be constructed to no steeper than 2:1 (horizontal:vertical). Fill slopes shall be constructed to no steeper than 3:1 (horizontal:vertical). Prior to placement of fill on an existing slope the existing slope shall be benched. The benches shall be in a ratio of 1 horizontal to 1 vertical. The face of the fill slopes shall be compacted as the fill is placed, or the slope may be overbuilt and then cut back to the design grade. Compaction by track walking will not be allowed.

3.13 FINISH GRADING

A. At completion of project, site shall be finished graded, as indicated on Drawings. Finish grades shall be "plane graded" to grades shown on the drawing. Mounding of finish grades will not be allowed unless otherwise directed on the landscape drawings. Tolerances for finish grades in drainage swales shall be +-0.05'. Tie in new and existing finish grades. Leave all landscaped areas in finish condition for lawn seeding. Landscaped planters shall be graded uniformly from edge of planter to inlets. If sod is used for turf areas the finish grade on which it is placed shall be lowered to allow for

sod thickness.

B. All landscape areas shall be left free of rock or foreign material.

C. All landscape areas shall be approved by Architect prior to any planting.

3.14 SURPLUS MATERIAL

A. Excavated material not required for grading or backfill shall be removed from site at contractor's expense.

3.15 CLEANING

A. Refer to Section 01 7700.

B. Remove from fill all vegetation, wood, form lumber, casual lumber, and shavings, in contact with ground; buried wood will not be permitted in any fill.

END OF SECTION 31 00 00

SECTION 31 22 19 FINISH GRADING

PART 1 GENERAL

1.1 SCOPE OF WORK

A. Provide all labor, materials, services, and equipment indicated on Drawings and/or herein specified to complete all Finish Grading Work.

B. Finish grading shall consist of scarifying and establishing finish grade to conform to the contours, grades, line and shapes as indicated on the Drawings, and ensuring that all landscape areas are uniformly graded to an outlet.

C. Related Sections: Related sections may include but are not limited to:

1. Section 31 20 00 Earthwork

2. Section 32 90 00 Planting

1.2 DEFINITIONS

A. Subgrade: Surfaces upon which additional specified materials are to be placed, prepared, or constructed.

B. Rough grade: The establishment of grades to one-tenth (1/10) foot plus or minus tolerance of grades required to accomplish the Work described in other documents and drawings.

C. Finish grade: The establishment of grades to a plus or minus tolerance of final grades as indicated on Drawings. Tolerances are specified in applicable documents of the specifications (i.e., Planting, Concrete, Decomposed Granite, etc.) Finish Grade elevations in planted areas reference top of soil. Allowance shall be made for installation of mulch, sod, etc. as shown in the drawings.

D. Grading intent: Spot elevations (grades) and contours are indicated based on the best available data. Drawings are referenced to provide additional site grading data. The intent is to maintain constant slopes between spot elevations. If a spot elevation is determined to be in error, or the difference in elevation between points change, contact the City's Representative immediately for field adjustments of spot elevations.

1.3 EXISTING UTILITIES

A. Contractor is responsible to contact Underground Service Alert (USA North) (811) or (800-642-2444) and mark the location of all existing utilities before commencing Work.

B. Refer to the Drawings for information on proposed site utilities and their locations.

C. Retain and protect in operating condition all active utilities traversing the site designated to remain.

D. Where existing utilities not indicated on the Drawings are encountered, support, shore up, protect same and immediately contact the Owner's Representative for continuance and/or relocation of such services.

1.4 PROTECTION OF EXISTING CONDITIONS AND ADJACENT PROPERTIES

A. Use all means necessary to protect existing conditions designated to remain, newly constructed conditions and adjacent properties. Avoid any encroachment on adjacent properties.

B. Prevent damage to existing benchmarks, pavement, and utility lines. In the event of damage or loss, immediately make all repairs and replacements required to the satisfaction of the Owner's Representative and at no additional cost to the Owner.

1.5 QUALITY ASSURANCE

A. Finish grades shall conform to contours, grades, lines, and shapes, as indicated on Drawings, with uniform slopes between finish grades or between finish grades and existing grades.

B. Establish finish landscape grades in a continuous, uniform line, resulting in a uniform surface with positive drainage and without ridges or water pockets.

C. Finish landscape grade tolerance shall be .04 feet plus or minus of final grades indicated on Drawings.

1.6 SUBMITTALS

A. Per Section 31 20 00

PART 2 PRODUCTS

A. Per Section 31 20 00 and Section 32 90 00

PART 3 EXECUTION

3.1 PROTECTION

A. Rough grades shall be within plus or minus .10 foot of final finish grades as indicated on plans. If any discrepancies exist, notify the Owner's Representative immediately for direction.

B. Contractor shall be responsible for bringing rough grades into conformity with finish grades as indicated on the plans. Comply with tolerances specified in this document and as specified in applicable documents of the specifications (i.e., concrete, asphalt, planting, etc.).

C. Conduct work in an orderly manner. Dirt shall not be permitted to accumulate on hardscape or be washed into storm drains.

D. Use all means required to prevent the erosion of freshly graded areas during construction and until such time as proposed hard surfaces and landscaping have been constructed.

3.2 LAYOUT

A. Layout of all work under this Section shall be made by a licensed surveyor.

B. Maintain all benchmarks, control monuments and stakes. Protect from damage and dislocation.

C. If any discrepancies are found by the surveyor between the Drawings and actual site conditions, the Owner's Representative reserves the right to make minor adjustment in Work Specified as necessary to accomplish the intent of the Contract Documents without increased cost to the Owner.

3.3 FINISH LANDSCAPE GRADING

A. Scarify or rototill to a 6” depth all planting areas prior to finish grade operations and work until uniform and free from large clods larger than one (1) inch in greatest dimension.

B. Finish grade shall conform, after compaction, to shapes, spot elevations and contours as indicated on Drawings, with uniform levels or slopes between finish elevations or between finish elevations and existing elevations. Landforms shall be naturally formed, with increasing or decreasing slopes as follows:

1. “Round-off” all high points or tops of slopes to finish grade as noted on the drawings in a parabolic fashion, without exceeding maximum or minimum slopes as shown or as required.

2. “Feather” all low points or bottoms of slopes to finish grade as noted on the drawings in a parabolic fashion, without exceeding maximum or minimum slopes as shown or as required.

C. Soil amendment and preparation shall comply with Section 32 90 00 Planting.

D. Spread excess soil material excavated from plant pits to establish subgrades in surrounding planting areas.

E. Top six (6) inches of all areas to be planted shall be free of stones, stumps, or other deleterious matter one (1) inch in greatest dimension.

F. Compact soil in planting areas to 85% relative compaction in accordance with ASTM D1557-78.

G. Fine grade all planting areas to a smooth, loose, and uniform surface. Eliminate uneven areas, ridges, and depressions.

H. Shrub/ground cover planting areas shall be graded three and one-half (3-1/2) inches below adjacent paved areas, sidewalks, valve boxes, mow bands, drains, etc. in order to receive a three-inch-deep layer of wood chip mulch, establishing final grade one-half (1/2) inches below these surfaces.

I. Turf areas shall be graded 1/2 inch in hydroseed, and 1 inch in sod, below adjacent paved area, sidewalks, valve boxes, mow bands, drains, top of seat walls etc. in order to receive turf, establishing final grade flush with these surfaces.

3.4 OBSERVATION SCHEDULE

A. Normal progress observations shall be requested by the Contractor from the Owner's Representative as per observations listed in Sections: 32 84 00 Planting Irrigation, and 32 90 00 Planting.

3.5 CLEAN UP

A. Remove all trash, excess soil, or rubbish from the property. All scars, ruts or other marks in the ground caused by this work shall be repaired and the ground left in a neat and orderly condition throughout the site.

B. The Contractor shall leave the site area broom-clean and shall wash down all paved areas within the Contract area, leaving the premises in a clean condition acceptable to the Owner's Representative.

END OF SECTION 31 22 19

SECTION 31 23 33 TRENCHING AND BACKFILLING

PART 1 GENERAL

1.1 INCLUSION OF OTHER CONTRACT DOCUMENTS

A. The General Conditions, Supplementary Conditions and Division 1 are fully applicable to this Section, as if repeated herein.

1.2 SECTION INCLUDES

A. Section 01 5000, Temporary Facilities and Controls.

B. Section 31 0000, Earthwork.

C. Section 31 2333, Trenching and Backfilling.

D. Section 32 8000, Irrigation.

E. Section 33 0000, Utilities.

F. Section 33 4000, Storm Drainage Utilities.

1.3 QUALITY ASSURANCE

A. Use only new materials and products unless existing materials or products are specifically shown otherwise on the Drawings to be salvaged and re-used.

B. All materials, components, assemblies, workmanship, and installation are to be observed by the Owner's Inspector of Record. Work not so inspected is subject to uncovering and replacement.

C. Contractor / Installer shall have been in business for five (5) years providing/finishing similar size projects and complexity.

1.4 SUBMITTALS

A. Refer to Section 01 3300.

B. Manufacturers data and shop drawings.

1.5 GUARANTEE

A. Refer to General Conditions and Section 01 3300.

1.6 REFERENCE AND STANDARDS

A. California Building Code (CBC), edition as noted on the drawings.

B. California Plumbing Code (CPC), edition as noted on the drawings.

1.7 DELIVERY, STORAGE AND HANDLING

A. Transport, store, and handling in strict accord with the local jurisdiction.

B. Make delivery to job when notified by Contractor verifying that the job is ready to receive the work of this Section and that arrangements have been made to properly store, handle and protect such materials and work.

1.8 PROJECT CONDITIONS

A. The contractor shall acquaint himself with all existing site conditions. If unknown active utilities are encountered during work, notify Architect promptly for instructions. Failure to notify will make Contractor liable for damage to these utilities arising from Contractor's operations subsequent to discovery of such unknown active utilities.

B. Field verify that all components, backing, etc. by others are installed correctly to proceed with installation of products as herein specified.

C. Trench dewatering may be necessary. Contractor shall provide any and all tools, equipment and labor necessary for trench dewatering no matter what the source. Dewatering shall be continuous until all site utilities are installed and backfilled. Contractor shall obtain all necessary permits for dewatering and disposal operations.

1.9 PROTECTION

A. Adequate protection measures shall be provided to protect workers and passers-by on and off the site. Adjacent property shall be fully protected throughout the operations. Blasting will not be permitted. Prevent damage to adjoining improvements and properties both above and below grade. Restore such improvements to original condition should damage occur. Replace trees and shrubs outside building area disturbed by operations. Repair all trenches in grass areas with new sod (seeding not permitted) and "stake-off" for protection.

B. Contractor shall be solely and completely responsible for working conditions at the job site, including safety of all persons and property during performance of the work. This requirement shall apply continuously and shall not be limited to normal working hours.

C. Any construction review of the Contractor's performance conducted by the Architect or Owner is not intended to include review of the adequacy of the Contractor's safety measures, in, on or near the construction site.

D. Provide shoring, sheeting, sheet piles and or bracing to prevent caving, erosion or gullying of sides of excavation.

E. Surface Drainage: Provide for surface drainage during period of construction in manner to avoid creating nuisance to adjacent areas. Keep all excavations free from water during entire progress of work, regardless of cause, source or nature of water.

F. Adjacent streets and sidewalks shall be kept free of mud, dirt or similar nuisances resulting from earthwork operations.

G. The site and adjacent influenced areas shall be watered as required to suppress dust nuisance.

H. Trees: Carefully protect existing trees which are to remain.

1.10 TRENCH SAFETY PROVISIONS

A. General Contractor shall be solely responsible for safety design, construction and coordination with agencies having jurisdiction. If such plan varies from shoring system standards established by Construction Safety Orders, plan shall be prepared by registered civil or structural engineer.

B. Nothing herein shall be deemed to allow use of shoring, sloping or protective system less effective than that required by Construction Safety Orders of California State Division of Industrial Safety.

C. When trenching through paved surface, provide steel trench plates to cover open trenches daily until trenches are backfilled.

1.11 SEASONAL LIMITS

A. No backfill material shall be placed, spread or rolled during unfavorable weather conditions. When work is interrupted by rains, fill operations shall not be resumed until field tests indicate that moisture content and density of fill are satisfactory.

B. Material above optimum moisture shall be processed per Section 31 0000, 3.8, B.

1.12 TESTING

A. General: Minimum testing shall be at 12” above pipe, every 12” of backfill, and at the surface of the subgrade or finish grade. This testing shall be performed every 200 feet of trench backfill or as deemed necessary by the County project inspector. The requirements of the project soils report by Geocon Consultants, Inc. dated September 2023 will be followed ~~an~~d can override these requirements. - PRODUCTS – not used

PART 2 - PRODUCT

2.1 MATERIAL

A. Prior to installation of the work of this Section, carefully inspect and verify by field measurements that installed Backfill materials: Pipeline and conduit trench backfill as shown on the plans and as specified below.

1. ¾ inch crush rock as specified on the plans.
2. 1 ½” clean drain rock suitable for leach line or horizontal percolation drains.
3. Native Materials: Soil native to Project Site, free of wood, organics, and other deleterious substances. Rocks shall not be greater than 2-inches.
4. Sand: Fine granular material, free of organic matter, mica, loam or clay.
5. Lean Mix Concrete: 3 sacks of cement per yard plus sand.
6. Class 2 aggregate base, ¾” rock, per Caltrans Section 26-1.02B
7. Controlled Density Fill: 3 sack slurry backfill.

B. Water: Furnish all required water for construction purposes, including compaction and dust control. Water shall be potable.

PART 3 - EXECUTION

3.1 INSPECTION

A. Verification of Conditions:

1. Examine areas and conditions under which work is to be performed.

2. Identify conditions detrimental to proper or timely completion of work and coordinate with General Contractor to rectify.

3.2 COORDINATION

A. General Contractor shall coordinate work as herein specified, in accordance with drawings and as required to complete scope of work with all related trades.

3.3 INSTALLATION

A. Perform work in accordance with pipe manufacturer's recommendations, as herein specified and in accordance with drawings.

3.4 TRENCHING

A. Perform work in accordance with pipe manufacturer's recommendations, as herein specified and in accordance with drawings. Make all trenches open vertical construction with sufficient width to provide free working space at both sides of trench around installed item as required for caulking, joining, backfilling and compacting; not less than 12 inches wider than pipe or conduit diameter, unless otherwise noted.

B. Carefully excavate around existing utilities to avoid unnecessary damage. The contractor shall anticipate and perform handwork near existing utilities as shown on the survey, without additional claims or cost.

C. Trench straight and true to line and grade with bottom smooth and free of edges or rock points.

D. Where depths are not shown on the plans, trench to sufficient depth to give minimum fill above top of installed item measured from finish grade above the utility as follows:

1. Sewer pipe: depth to vary

2. Storm drain pipe: depth to vary

3. Water pipe - Fire Supply: 36 inches

4. Water pipe – Domestic Supply: 30 inches

3.5 BACKFILL

A. Pipe Trench Backfill is divided into three zones:

1. Bedding: Layer of material directly under the pipe upon which the pipe is laid. If native soil is stable and free of rocks (larger than 1”), no bedding is required unless shown on the drawings.

2. Pipe Zone: Backfill from the top of the bedding to 6 inches (compacted) over the top of the pipe.

3. Upper Zone: Backfill between top of Pipe Zone and to surface of subgrade.

B. Perform work in accordance with pipe manufacturer’s recommendations, as herein specified and in accordance with drawings. Make all trenches open vertical construction with sufficient width to provide free working space at both sides of trench around installed item as required for caulking, joining, backfilling and compacting; not less than 12 inches wider than pipe or conduit diameter, unless otherwise noted

C. Pipe Zone and Upper Zone Backfill:

1. Type of material and degree of compaction Pipe Zone and Upper Zone Backfill shall be as required by Drawings, Details, & Specifications. Native soil material free of organics and debris with no rocks or clods larger than 1” may be used if the sand Equivalent (SE) is greater than 20.
2. Upper Zone Backfill shall not be placed until conformance of Bedding and Pipe Zone Backfill with specified compaction test requirements has been confirmed.

3. backckfill shall be brought up at substantially the same rate on both sides of the pipe and care shall be taken so that the pipe is not floated or displaced. Material shall not be dropped directly on pipe.

D. Backfill Compaction:

1. Backfill shall be placed in layers which, when compacted shall not exceed 6 inches in thickness. Each layer shall be spread evenly and thoroughly mixed to insure uniformity. Do not backfill over, wet, frozen or soft subgrade surfaces. Employ a placement method that does not disturb or damage foundation walls, perimeter drainage, foundation damp-proofing, waterproofing or protective cover.

2. When moisture content of fill material is below that required to achieve specified density, add water until proper moisture content is achieved. When moisture content is above that required, aerate by blading or other methods until specified moisture content is met, see section 31 0000 3.8, B.

3. After each layer has been placed, mixed and spread evenly, it shall be thoroughly compacted to the specified maximum dry density while at specified moisture content for Pipe and Upper Zone Backfill Material. Compact each layer over its entire area until desired density has been obtained.

4. Compaction: Bedding, Pipe Zone and Upper Pipe Zone Backfill Material shall be thoroughly compacted to 90% of maximum dry density while at specified moisture content. Areas receiving concrete curbs, sidewalks, or pavement shall have the top 6” of below subgrade compacted to 95% of maximum dry density at specified moisture content, or as specified by the Geotechnical Engineer. All backfill operations shall be observed by the Inspector of Record and/or Geotechnical Engineer. Field density tests shall be made to check compaction of fill material. If

densities are not satisfactory, Contractor will be required to change equipment or procedure or both, as required to obtain specified densities. Notify Inspector and Architect at least 24 hours in advance of any operation.

E. Backfill in Areas Previously Lime or Cement Treated

1. Where trenching occurs in areas that have been lime or cement treated, class 2 aggregate bases or approved controlled density backfill material shall be used for the top 12-inches minimum of the trench or thickness shall match the depth of treated material.

3.6 TRENCH AND SITE RESTORATION

A. Finished surface of trenches shall be restored to a condition equal to, or better than the condition as existed prior to excavation work.

3.7 PROTECTION

A. Protect existing surfaces, structures, and utilities from damage. Protect work by others from damage. In the event of damage, immediately repair or replace to satisfaction of Owner.

B. Repair existing landscaped areas to as new condition. Replant trees, shrubs or groundcover with existing materials if not damaged or with new materials if required. Replace damaged lawn areas with sod, no seeding will be permitted.

C. Replace the damaged pavement with new compatible matching materials. Concrete walks to be removed to nearest expansion joint and entire panel replaced. Asphalt to be cute neatly and replaced with new materials.

D. Any existing materials removed or damaged due to trenching to be returned to new condition.

3.8 SURPLUS MATERIAL

A. Remove excess excavated material, unused materials, damaged or unsuitable materials from site.

3.9 CLEANING

A. Refer to Section 01 7700.

B. The contractor will keep the work areas in a clean and safe condition so his rubbish, waste, and debris do not interfere with the work of others throughout the project and at the completion of work.

C. After completion of work in this section, remove all equipment, materials, and debris. Leave the entire area in a neat, clean, acceptable condition.

END OF SECTION 31 23 33

SECTION 32 12 00 ASPHALT CONCRETE PAVING

PART 1 GENERAL

1.1 INCLUSION OF OTHER CONTRACT DOCUMENTS

A. The General Conditions, Supplementary Conditions and Division 1 are fully applicable to this Section, as if repeated herein.

1.2 SECTION INCLUDES

A. Section 01 5000, Temporary Facilities and Controls.

B. Section 31 0000, Earthwork.

C. Section 31 2333, Trenching and Backfilling.

D. Section 32 8000, Irrigation.

E. Section 33 4000, Storm Drainage Utilities.

1.3 QUALITY ASSURANCE

A. Use only new materials and products unless existing materials or products are specifically shown otherwise on the Drawings to be salvaged and re-used.

B. All materials, components, assemblies, workmanship, and installation are to be observed by the Owner's Inspector of Record. Work not so inspected is subject to uncovering and replacement.

C. The representatives of the Owner’s testing lab will not act as supervisor of construction, nor will they direct construction operations. Neither the presence of the Owner’s testing lab representatives nor the testing by the Owner’s testing lab shall excuse the contractors or subcontractors for defects discovered in their work during or following completion of the project. Correcting inadequate compaction is the sole responsibility of the contractor.

D. Contractor shall provide verification that asphalt mix temperature meets the requirements of this specification at time of application.

E. Contractor shall be solely responsible for all subgrades built. Any repairs resulting from inadequate compaction are the responsibility of the contractor.

1.4 SUBMITTALS

A. Refer to Section 01 3300.

B. Manufacturer's Data: Submit list and complete descriptive data of all products proposed for use. Include manufacturer's specifications, published warranty or guarantee, installation instructions, and maintenance instructions.

C. Guarantee of Contractor/Subcontractor per Article 1.5.

1.5 GUARANTEE

A. Refer to General Conditions and Section 01 3300.

B. Submit fully executed Guarantee with submittal package required by Article 1.4.

1.6 REFERENCE AND STANDARDS

A. California Building Code (CBC), edition as noted on the drawings.

B. California Plumbing Code (CPC), edition as noted on the drawings.

C. California Building Code (CBC), edition as noted on the drawings.

D. ANSI/ASTM D698-00 - Test Methods for Moisture-Density Relations of Soils and Soil-Aggregate Mixtures, Using 5.5 lb (2.49 Kg) Rammer and 12 inch (304.8 mm) Drop.

E. ANSI/ASTM D1556-00 - Test Method for Density of Soil in Place by the Sand-Cone Method.

F. ANSI/ASTM D1557-02 - Test Methods for Moisture-Density Relations of Soils and Soil-Aggregate Mixtures Using 10 lb. (4.54 Kg) Rammer and 18 inch (457 mm) Drop.

G. ANSI/ASTM D 3017-05 Test Methods for Moisture Content of Soils and Soil-Aggregate Mixture by Nuclear Methods (Shallow Depth).

H. ANSI/ASTM D 422-63 Test Method for Particle Size Analysis of Soil.

I. ANSI/ASTM D 4318-05 Test Method for Liquid Limit, Plastic Limit, and Plasticity Limit.

J. CALTRANS Standard Specifications.

K. CAL-OSHA, Title 8, Section 1590 (e).

L. Any work within the street, highway or right-of-way shall be performed in accordance with the requirement of the governmental agencies having jurisdiction and shall not begin until all of those governing authorities have been notified.

1.7 DELIVERY, STORAGE AND HANDLING

A. Transport, store, and handling in strict accord with the local jurisdiction.

B. Make delivery to job when notified by Contractor verifying that the job is ready to receive the work of this Section and that arrangements have been made to properly store, handle and protect such materials and work.

1.8 PROJECT CONDITIONS

A. Environmental Requirements:

1. Asphalt Concrete Base (Bottom) Course: Do not lay base course on muddy subgrade, during wet weather, or when atmospheric temperature is below 40 degrees F.

2. Asphalt Surfacing: Do not apply asphaltic surfacing on wet base, during wet weather, or when atmospheric temperature is below 50 degrees F.

1.9 PROTECTION

A. Contractor shall acquaint himself with all site conditions. If unknown active utilities are encountered during work, notify Architect promptly for instructions. Failure to notify will make Contractor liable for damage to these utilities arising from Contractor's operations subsequent to discovery of such unknown active utilities.

1.10 PROTECTION

A. Adequate protection measures shall be provided to protect workmen and passers-by on and off the site. Adjacent property shall be fully protected throughout the operations. Blasting will not be permitted. Prevent damage to adjoining improvements and properties both above and below grade. Restore such improvements to original condition should damage occur. Replace trees and shrubs outside building area disturbed by operations.

B. In accordance with generally accepted construction practices, the Contractor shall be solely and completely responsible for working conditions at the job site, including safety of all persons and property during performance of the work. This requirement shall apply continuously and shall not be limited to normal working hours.

C. Any construction review of the Contractor's performance conducted by the owner’s representative is not intended to include review of the adequacy of the Contractor's safety measures, in, on, or near the construction site.

D. Surface Drainage: Provide for surface drainage during period of construction in manner to avoid creating nuisance to adjacent areas. The contractor shall make a reasonable effort on a daily basis to keep all excavations and the site free from water during entire progress of work, regardless of cause, source, or nature of water.

E. Adjacent streets and sidewalks shall be kept free of mud, dirt or similar nuisances resulting from earthwork operations.

F. The site and adjacent influenced areas shall be watered as required to suppress dust nuisance. Dust control measures shall be in accordance with the local jurisdiction.

1.11 SEASONAL LIMITS

A. No fill material shall be placed, spread or rolled during unfavorable weather conditions. When work is interrupted by rains, fill operations shall not be resumed until field tests indicate that moisture content and density of fill are satisfactory.

1.12 TESTING

A. General: Refer to County of San Mateo Standard Specifications and Cal Trans Standard Plans Section 39.

B. Geotechnical Engineer: Owner is retaining a Geotechnical Engineer to determine compliance of pavement with Specifications, and to direct adjustments in paving operations. Costs of Geotechnical Engineer will be borne by Owner; except those costs incurred for re-tests or re-inspection will be paid by Owner and back-charged to Contractor.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. VOC Limits for adhesives, sealants, fillers, coatings and primers. Comply with limits specified in related Section.

2.2 MATERIALS

A. Sterilant: Soil sterilizer shall be CIBA GEIGY's Pramatol 25-E, Treflan EC or Thompson-Hayward Casoron.

1. Soil sterilizer shall be applied in strict accordance with the manufacturer's instructions where specified on the drawings. Soil sterilizer will only be applied in selected areas as shown on the drawings.

B. Base Course Aggregate: State Specifications, Section 26, Class 2 aggregate base (3/4" max.).

C. Asphalt Binder: Steam-refined paving asphalt conforming to State Specifications, Section 92, viscosity grade PG 64-10. Asphalt binder additives for WMA per Caltrans approved list of manufacturer's.

D. Liquid Asphalt Tack Coat: Per CALTRANS section 94.

E. Surface Course Aggregate: Mineral aggregates for Type "B" asphalt concrete, conforming to State Specifications 39-2.02, Type B, ½" maximum, medium grading for final lift. ¾" maximum medium grading may be used for lower lifts if approved by Architect..

F. Seal Coat: Seal coat shall be applied in strict accordance with manufacturer's instructions where specified on the drawings. Seal coat shall be a two-coat application with a pre-mixed asphalt emulsion blended with select fillers and fibers such as:

1. "Park-Top No. 302", Western Colloid Products.

2. "Overcoat", Reed and Gram.

3. "Drivewalk", Conoco Oil.

G. Crack Fill:

1. Cracks ¼" – 1": "Docal 1100 Viscolastic, distributed by Conoco, Inc., Elk Grove, CA, (916) 685-9253, or approved equal.

2. Cracks greater than 1": 1/2" Hot Mix Asphalt Concrete Material.

H. Wood Headers and Stakes: Pressure treated Douglas Fir or redwood boards with ½" diameter steel stakes 18" in length.

I. Pavement Marking: Colors as directed by Architect. Colors of painted traffic stripes and pavement markings must comply with ASTM D 6628.

1. Waterborne traffic line - colors white, yellow and red, State specification PTWB-01R3.

2. Waterborne traffic line for the international symbol of accessibility and other curb markings – blue, red and green, Federal specification TT-P-1952E.

J. Precast Concrete Bumpers: 3,000 psi at 28 day minimum strength; 48" length unless otherwise indicated; provide with steel dowel anchors and concrete epoxy.

K. Pavement Epoxy; K-Lite; Ktepx-590; Ennis Epoxy HPS2 or an approved equal.

L. Crack Filler; QPR model CAR08, 10oz asphalt crack filler; Star STA-FLEX Trowel Grade crack filler or approved equal.

Reclaimed Asphalt Pavement (RAP). HMA Type A or Type B may be produced using RAP providing it does not exceed 15% or the aggregate blend. This mix is subject to approval by the County and/or Architect.

2.3 MIXES

A. General: Plant mixed conforming to State Specifications, Section 39, Type B, ½" maximum, medium grading, or ¾" maximum, medium grading as applicable.

B. Temperature of Hot Mix Asphalt: Not less than 275 degrees F nor more than 325 degrees F when added to aggregate.

C. Temperature of Hot Mix Aggregate: Not less than 250 degrees F nor more than 325 degrees F when asphalt is added.

D. Temperature of Hot Mix Asphalt Concrete: Asphalt shall be not less than 285 degrees at time of application, nor more than 350 degrees. Asphalt not meeting the required temperature shall not be used.

E. Temperature of Warm Mix Asphalt: Mixing and placement; per the approved manufactures heat range recommendations for mixing and placement.

PART 3 - EXECUTION

3.1 EXAMINATION OF CONDITION

A. Conditions of Work in Place: Subsurfaces which are to receive materials specified under this Section shall be carefully examined before beginning work hereunder, and any defects therein shall be reported, in writing, to the Architect. Work shall not be started until such defects have been corrected. Starting work shall imply acceptance of conditions as they exist.

3.2 PREPARATION

A. Sub-Grade: Clean, shape and compact to hard surface free from elevations or depressions exceeding 0.05', or 0.05' in 10' from true plan. Compaction shall be 95% for the upper 6" of native subgrade, and 95% for all aggregate base. Compact per Section 31 2000. Compaction and moisture content shall be verified immediately prior to placement of asphalt. Proof roll subbase in presence of geotechnical engineer prior to placement of aggregate base.

3.3 INSTALLATION

A. Header Boards:

1. General: Install as edging to asphalt paving, except where adjoining existing pavement, concrete curbs, walks or building.

2. Existing Header Boards: Remove existing headers where new paving will join existing. Saw cut existing asphalt to provide clean edge.

3. Lines and Levels: Install true to line and grade. Cut off tops of stakes 2-inches below top of header board so they will not be visible on completion of job.

B. Asphalt Paving:

1. Aggregate Base: Install in accord with State Specifications, Section 26. Compact to relative compaction of not less than 95%, ASTM D1557. The material shall be deposited on the subgrade in such a manner as to provide a uniform section of material within five percent tolerance of the predetermined required depth. Deposition will be by spreader box or bottom dump truck to prevent segregation of the material. The material so deposited on the subgrade shall have sufficient moisture which, in the opinion of the Architect is adequate to prevent excessive segregation. It shall then be immediately spread to its planned grade and cross section. Undue segregation of material, excessive drifting or spotting of material will not be permitted. If in the opinion of the site geotechnical engineer, the material is unsuitably segregated, it shall be removed or completely reworked to provide the desired uniformity of the material.

2. Liquid Asphalt Tack Coat: Apply as "tack coat" to all vertical surfaces of existing paving, curbs, walks, and construction joints in surfacing against which paving is to be placed.
3. Asphalt Concrete Surface Course:

   a. Comply with State Specifications, 39-6 except as modified below.

      1) Final gradation shall be smooth, uniform and free of ruts, humps, depressions or irregularities, with a minimum density of 95% of the test maximum density determined by California Test Methods #304 and 375. If allowed by the Architect, engineer and project inspector the contractor may be allowed to use the Caltrans "Method" specification based on the number of passes with the proper roller over the asphalt concrete surface.

      2) Maximum variation 1/8 inch in 10' when measured with steel straightedge in any one direction. Test paved areas for proper drainage by applying water to cover area. Correct portions that

do not drain properly by patching with plant mix. In no case shall accessible parking spaces or loading and unloading areas exceed 2.0% slope in any direction.

3) Asphalt material shall be delivered to the project site in a covered condition to maintain acceptable temperature.

4. Placement and adjustment of Frames, Covers, Boxes and Grates: The Contractor shall set and adjust to finish grade all proposed and existing frames, covers, boxes, and grates of all manholes, drop inlets, drain boxes, valves, cleanouts, electrical boxes and other appurtenant structures prior to placement of asphaltic concrete. All of the aforementioned boxes shall be secured to the grade with a 6” thick and 6” deep concrete collar. If appurtenance boxes are raised to grade after the paving operation, the excavation shall be filled with 1” of asphalt concrete pavement after the concrete collar has properly cured.

5. Water Testing: All paved areas shall be water tested, to check drainage, in the presence of the project inspector prior to placement of seal coat. The surface of asphalt paving shall not vary more than 1/8 inch above or below the grade established on the plans. If variations in grade are present, they will be corrected by overlaying paving and/or pavement removal and replacement as directed by the Architect.

6. Patching: Cut existing paving square and plumb at all edges to be joined by new paving. In trenches; grind existing asphalt on each side of trench 3” wide x ½ the depth of the section. Apply tact coat to vertical surfaces before installing new work. Warp carefully to flush surface, with seal over joints, and feather edge. Sawcut, remove and patch existing paving where cutting is necessary for installation of piping or conduits under Divisions 15, 16 and 33.

7. Seal Coat:

   a. Seal coat shall be applied no sooner than 30 days from time of asphalt placement.

   b. Surface Preparation: surface shall be clean of all dirt, sand, oil or grease. Hose down entire area with a strong jet of water to remove all debris. Remove soft, loose, or otherwise damaged areas of asphalt concrete to full depth of damage and replace with compacted asphalt concrete as specified herein. Minor holes and imperfections may be patched using hot mix asphalt or mastic using sand/SS-1-H. Remove any cold mix asphalt concrete and replace with new hot mix asphalt concrete to a depth exceeding the existing plus 1”. Use wire brush for removal of oil and grease; prime with shellac or synthetic resin as recommended by manufacturer of pavement sealer material.

   c. Crack Filler: Fill all cracks with a liquid crack filler for cracks ¼” to 1”. Cracks 1” and greater shall be filled with ½”hot mix asphalt concrete.

   d. Seal Coat Seal Application: Thoroughly mix materials in the presence of the onsite inspector. Failure to do so will be cause for rejection. Apply both coats in accordance with manufacturer's written instructions.

e. Clean-Up and Precautions: As recommended by pavement sealer material manufacturer.

C. Pavement Marking: painted pavement markings shall be done only after the seal coat has thoroughly dried. On clean surfaces to be painted with traffic paint of dust, dirt, grime, oil, rust or other contaminants which will impair the quality of work or interfere with proper bond of paint coats. Surfaces shall be cleaned to the extent and by whatever means that will satisfactorily accomplish the purpose without damage to asphalt concrete. Provide measured layouts, temporary markings, templates, and other means necessary to provide required marking. Prepare and apply paint in accordance with manufacturer's instructions; paint shall be applied by spray and shall achieve complete coverage free from voids and thin spots. Where indicated on the Drawings, paint parking stall stripes, lettering, arrows, accessible symbols, playground markings, game striping, maps, etc. on concrete paving or asphalt concrete paving. Paint stripes shall be 4 inches wide (except otherwise indicated) and applied with two (2) coats of herein specified Traffic Line Paint; white (except as otherwise specified or indicated).

1) International Accessible Symbol: Symbol shall be white figures on a blue background. Blue shall be equal to color No. 15090 in Fed. Std. 595c. Lines and symbols shall be accurately formed and true to line and form; lines shall be straight and uniform in width. Painted edges shall be clean cut and free from raggedness, and corners shall be cut sharp and square. Tolerances: Apply striping within a tolerance of 1/2 inch in 50 feet. Apply markings and striping to widths indicated with a tolerance of 1/4 inch on straight sections and 1/2 inch on curved sections.

D. Colors: As directed by Architect

E. Precast Concrete Bumpers: Install where shown, using steel dowels, and epoxy applied for length to wheel stop without damage to bumpers or asphalt concrete paving.

3.4 CLEANING

A. Upon completion of the work of this Section promptly remove from the working area all scraps, debris and surplus material of this Section.

B. Clean excess material from surface of all concrete walks and utility structures.

END OF SECTION 32 12 00

SECTION 32 16 00 SITEWORK CONCRETE

PART 1 - GENERAL

1.1 INCLUSION OF OTHER CONTRACT DOCUMENTS

A. The General Conditions, Supplementary Conditions and Division 1 are fully applicable to this Section, as if repeated herein.

1.2 RELATED WORK SPECIFIED ELSEWHERE

A. Section 01 4523, Testing & Inspection Services.

B. Section 31 0000, Earthwork.

1.3 QUALITY ASSURANCE

A. NFPA 13 - Standard for the Installation of Sprinkler Systems; National Fire Protection Association 2016. Use only new materials and products.

B. Use materials and products of one manufacturer whenever possible.

C. All materials, components, assemblies, workmanship and installation are to be observed by the Owner's Inspector of Record. Work not so inspected is subject to uncovering and replacement.

D. Sieve analysis from testing laboratories identifying rock/sand percentages within the concrete mix; or class 2 aggregate base shall have the current project name and project location identified on the report. Outdated analytical reports greater than 90 days old will not be accepted.

1.4 SUBMITTALS

A. Refer to Section 01 3300.

B. Manufacturer's Data: Submit list and complete descriptive data of all products proposed for use. Include manufacturer's specifications, published warranty or guarantee, installation instructions, and maintenance instructions.

C. Materials list: Submit to the Architect a complete list of all materials proposed to be used in this portion of the work. Submitted items should include but are not limited to sand, gravel, admixtures, surface treatments, coloring agents, sealers, fibers, cast-in-place accessories, forming and curing products and concrete mix designs.

D. With concrete submittal, provide documented history of mix design performance.

E. Guarantee of Contractor/Subcontractor per Article 1.5.

1.5 GUARANTEE

A. Refer to General Conditions and Section 01 3300.

B. Submit fully executed Guarantee with submittal package required by Article 1.4. See

Part 3 of this specification regarding concrete finishing and defective concrete.

1.6 REFERENCE AND STANDARDS

A. California Building Code (CBC), edition as noted on the drawings.

B. ACI Standards, ACI 211.1, ACI 318-05, ACI 302, IR-04, ACI 301-05, ACI 305R-99, ACI 306R-02, ACI 308-98.

C. ASTM C-94, Specification for Ready-Mixed Concrete.

D. Concrete Reinforcing Steel Institute (CRSI) Manual of Standard Practice (latest edition).

E. ACI 347 Recommended Practice for Concrete Formwork.

F. ASTM – American Society for Testing and Materials.

1.7 DELIVERY, STORAGE AND HANDLING

A. Deliver undamaged products to job in manufacturer's sealed containers and/or original bundles with tags and labels intact.

B. Store materials in protected, dry conditions off of ground and in areas so as to not interfere with the progress of the work.

C. Transport, store and handle in strict accord with the manufacturer's written recommendations.

D. Make delivery to job when notified by Contractor verifying that the job is ready to receive the work of this Section and that arrangements have been made to properly store, handle and protect such materials and work.

E. Store cement in weather tight building, permitting easy inspection and identification. Protect from dampness. Lumpy or stale cement will be rejected.

F. Aggregates: Prevent excessive segregation, or contamination with other materials or other sizes of aggregate. Use only one supply source for each aggregate stockpile.

1.8 TESTING

A. Cement and Reinforcing shall be tested in accordance with CBC Section 1913A. Testing of reinforcing may be waived in accordance with Section 1913A.4 when approved by the Structural Engineer.

1.9 ADEQUACY AND INSPECTION

A. Design, erect, support, brace and maintain formwork and shoring to safely support all vertical and lateral loads that might be applied until such loads can be carried by concrete.

B. Notify Inspector and Architect at least 48 hours prior to placing of concrete.

1.10 PROTECTION

A. Finish surfaces shall be protected at all times from concrete pour. Inspect forming against

such work and establish tight leak-proof seal before concrete is poured. Finish work damaged, defaced or vandalized during the course of construction shall be replaced by contractor at contractor expense.

PART 2 – PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. VOC Limits for adhesives, sealants, fillers, coatings and primers. Comply with limits specified in related Section.

B. Provide products conforming to local, State and Federal government requirements limiting the amount of volatile organic compounds contained in the product, for its intended application. If specified product exceeds current requirement, provide conforming product at no additional cost. Provide written confirmation to Architect describing reason for revision and demonstrate compliance of replacement product with specified requirements.

2.2 MATERIALS

A. Cement: Portland cement, ASTM C150, Type II, per ACI 318 Section 3.2.

B. Concrete Aggregates: Normal weight aggregates shall conform to ASTM C33, except as modified by this section. Combined grading shall meet limits of ASTM C33. Lightweight aggregate shall conform to ASTM C330, suitably processed, washed and screened, and shall consist of durable particles without adherent coatings.

C. Water: Clean and free from deleterious amounts of acids, alkalis, scale, or organic materials and per ACI 318 Section 3.4.

D. Fly Ash: Western Fly Ash, conforming to ASTM C618 for Class N or Class F materials (Class C is not permitted). Not more than 15% (by mass) may be substituted for Portland Cement only if approved by Architect.

E. Water Reducing Admixture: Admixture to improve placing, reduce water cement ratio, and ultimate shrinkage may be used. Provide WRDA 64 by Grace Construction Products or approved equal. Admixture shall conform to ASTM C494 and ACI 318 Section 3.6. Such admixture must receive prior approval by the Architect, Structural Engineer, and the Testing Lab, and shall be included in original design mix.

F. Air-entraining Admixture: Daravair 1000 by Grace Construction Products or approved equal. Admixture must conform to ASTM C260 and CBC Section 1904 A.2.1.

G. Surface Retarder (for exposed aggregate finishes): Rugasol-S by Sika Corporation or approved equal.

H. Surface Treatments and Coloring Agents:

1. One pound of lampblack shall be added per cubic yard of concrete per County standards. Provide at all exterior concrete slabs, walks, ramps, stairs (including bleachers) and other exposed flatwork. Add colorant to mix in accordance with manufacturer's printed instructions.

I. Form Material (Concrete Exposed to View): 5/8" (min) APA B-B Ply-form, steel or Sonotubes.

J. Form Material (Concrete concealed from View): 5/8" (min) APA B-B Plyform, steel or 1 x 8 DF. No. 2 or better.

K. Form Ties: Snap off metal of fixed length: leaving no metal within 1-1/2 inches of surface and no fractures, spalls or other surface defects larger than one-inch diameter; manufactured by Burke, Dayton Superior, or accepted equal.

L. Spreaders: Metal (no wood permitted).

M. Form Coating: Material which will leave no residue on concrete surface that will interfere with surface coating, as approved by the Architect.

N. Chamfer Strips: Rigid PVC, ¾" x ¾", in maximum possible lengths; manufactured by Burke, Greenstreak, Vulco, or accepted equal.

O. Expansion Joint Material: Preformed 3/8" fiber material, with bituminous binder manufactured for use as concrete expansion joint material, as accepted by the Architect.

P. Reinforcement Bars: New billet steel deformed bars conforming to requirements of ASTM A615 or ASTM A706; Grade 60. Dowels for installation through expansion joints or construction joints to existing sidewalks or concrete features shall be smooth or shall be sleeved on one end for slippage.

Q. Welded Wire Mesh: 6 X 6 W1.4/1.4 in pre-formed sheets only conforming to the requirements of ASTM A185. Welded Wire Mesh rolls will not be allowed to be used. Fully support mesh sheets on pre-cast concrete support blocks.

R. Reinforcing supports: Galvanized metal chairs or spacers or metal hangers, accurately placed 3'-0"
O.C.E.W. Staggered and each support securely fastened to steel reinforcement in place. Bottom bars in footings may be supported with 3" concrete blocks with embedded wire ties. Concrete supports without wire ties will not be allowed.

S. Truncated Domes: Vitrified Polymer Composite (VPC), Cast-In-Place Detectable/Tactile Warning Surface Tiles; "ADA Solutions" or approved equal. Tiles shall comply with Americans with Disabilities Act and the California Code of Regulations (CCR) Title 24, Part 2, Chapter 11B. Install tiles as recommended by manufacturer.

1. Color: As selected by the County.

T. Curing Compound (for exterior slabs only): Burke Aqua Resin Cure by Burke by Edoco, 1100 Clear by
W.R. Meadows or accepted equal. Water based membrane-forming concrete curing compound meeting ASTM C 309 and C1315.

U. Concrete Bonding Agent: Weld-Crete by Larson Products Corp., Daraweld C by Grace Construction Products or accepted equal.

V. Patching Mortar: Meadow-Crete GPS, one-component, trowel applied, polymer enhanced, shrinkage-compensated, fiber reinforced, cementitious repair mortar for horizontal, vertical and overhead applications as manufactured by W.R. Meadows or accepted equal.

W. Non-shrink Grout: Masterflow 713 Plus by Master Builders or approved equal. Premixed, non-metallic, no chlorides, non-staining and non-shrinking per CRD-C621, Corps of Engineers Specification and ASTM C 1107, Grades B and C.

X. Aggregate Base: Class 2 Aggregate Base per Caltrans specification section 26-1.02A.

Y. Joint sealant for expansion joints: Single component silicone sealant, Type S, ASTM D5893.

1. Reference Standard: ASTM C920, Grade P, Class 25, Use T.
2. Dow Corning 890-SL (self-leveling) Silicone, or accepted equal.
3. Dow Corning 888-NS (non-sagging) Silicone, at slopes exceeding 5%. May not be used at asphalt surfaces.
4. Color: Custom color as selected by Architect.

Z. Pre- Formed plastic Expansion Joint; W.R. Meadows 3/8" "Snap Cap", Tex-Trude expansion joint cap, or an approved equal.

2.3 CONCRETE DESIGN AND CLASS

A. Designed Strength and Classes of Concrete: The following mixes are not applicable to concrete items exceeding 4 feet in height above the adjacent grade.

1. Class "B": Concrete shall have 1" max. size aggregate, shall have 3,000 psi min. at 28 day strength with a maximum water to cementitious ratio no greater than 0.50. Use for exterior slabs, including walks, vehicular paved surfaces, manhole bases, poured-in-place drop inlets, curbs, valley gutters, curb & gutter and other concrete of like nature.
2. Class "D" concrete of 1" max. size aggregate shall have 4,000 psi 28 day strength with a maximum water to cementitious materials ratio of 0.55. Use for footings and retaining walls not attached to buildings, and planter walls, monument signs, and other site concrete not described for use in Class "B".

B. Slump Limits: Provide concrete, at point of final discharge, of proper consistency determined by Test Method ASTM C143 with a slumps of 4" plus or minus 1".

C. Mix Design: All concrete used in this work will be designed for strength in accordance with provisions of CBC, Section 1905A.1.9. Should the Contractor desire to pump concrete, a modified mix design will need to be submitted for review. Fly ash may be used in concrete to improve workability in amounts up to 15% of the total cementitious weight if approved by Architect.

D. Air Entrainment: Provide at concrete paving / flatwork, including concrete ramps and stairs, per the Local Jurisdiction minimum requirements, but no less than 3%.

2.4 MIXING OF CONCRETE

A. Conform to requirements of CBC, Chapter 19A.

B. All concrete shall be mixed until there is uniform distribution of material and mass is uniform and homogenous; mixer must be discharged completely before the mixer is recharged.

C. Concrete shall be Ready-mixed Concrete: Mix and deliver in accordance with the requirements set forth in ASTM C94 and ACI 301. Batch Plant inspection may be waived in accordance with CBC Section 1704A.4A, when approved by Structural Engineer.

1. Approved Testing Laboratory shall check the first batching at the start of the work and furnish mix proportions to the Licensed Weighmaster.

2. Licensed Weighmaster to positively identify materials as to quantity and to certify to each load by ticket.
3. Ticket shall be transmitted to Project Inspector by truck driver with load identified thereon. Project Inspector will not accept load without load ticket identifying mix and will keep daily record of pours, identifying each truck, its load and time of receipt and will transmit two copies of record to County inspector.
4. At end of project, Weighmaster shall furnish affidavit to County inspector on form satisfactory to County, certifying that all concrete furnished conforms in every particular and to proportions established by mix designs.
5. Placement of concrete shall occur as rapidly as possible after batching and in a manner which will assure that the required quality of the concrete is maintained. In no case may concrete be placed more than 90 minutes from batch time.
6. Water may be added be added to the mix only if neither the maximum permissible water-cement ratio nor the maximum slump is exceeded. In no case shall more than 10 gallons of water shall be added to a full 9 yard load, or 1 gal. per yard on remaining concrete within the drum providing load tag indicates at time of mixing at plant will allow for additional water.

2.5 MATERIALS TESTING

A. Materials testing of concrete and continuous batch plant inspection may be waived in accordance CBC Sections 1705A.3.3 when approved by Structural Engineer/Architect and County.

B. Testing of concrete shall be performed per article 3.12 of this specification.=

2.6 EQUIPMENT

A. Materials testing of concrete and continuous batch plant inspection may be waived in accordance CBC Sections 1705A.3.3 when approved by Structural Engineer/Architect and County.

PART 3 - EXECUTION

3.1 APPROVAL OF FORMS AND REINFORCEMENTS

A. Forms and reinforcements are subject to approval by the Project Inspector, and notice of readiness to place first pour shall be given to County inspector, Architect and Structural Engineer 48 hours prior to placement of concrete. Before placing concrete, clean tools, equipment and remove all debris from areas to receive concrete. Clean all reinforcing and other embedded items off all coatings oil, and mud that may impair bond with concrete.

B. All reinforcing steel shall be adequately supported by approved devices on centers close enough to prevent any sagging.

C. All reinforcing bar lap splices shall be staggered a minimum of 5 ft.

D. Additional reinforcing steel shall be placed around all utility boxes, valve boxes, manhole frames and covers that are located within the concrete placements.

1. The bars shall be placed so that there will be a minimum of 1 ½” clearance and a maximum of 3” clearance. The reinforcing steel shall be placed mid-depth of concrete slab.

E. At all right angles or intersections of concrete walks, additional 2'x2' #5, 90 degree bars shall be added at all inside corners for additional crack control. The bars shall be placed 2" from concrete forms and supports at mid-depth of slab.

3.2 PROTECTION

A. Protect work and materials of this Section prior to and during installation, and protect the installed work and materials of other trades.

B. In the event of damage, make all repairs and replacements necessary to the approval of the Architect at no additional cost to the Owner.

3.3 CLEANING

A. Reinforcement and all other embedded items at time of placing concrete to be free of rust, dirt oil or any other coatings that would impair bond to concrete.

B. Remove all wood chips, sawdust, dirt, loose concrete and other debris just before concrete is to be poured. Use compressed air for inaccessible areas. Remove all standing water from excavations.

3.4 FORMING

A. Form material shall be straight, true, sound and able to withstand deformation due to loading and effects of moist curing. Materials which have warped or delaminated, or require more than minor patching of contact surfaces, shall not be reused.

B. Build forms to shapes, lines, grades and dimensions indicated. Construct form work to maintain tolerances required by ACI 301. Forms shall be substantial, tight to prevent leakage of concrete, and properly braced and tied together to maintain position and shape. Butt joints tightly and locate on solid backing. Chamfer corners where indicated. Form bevels, grooves and recesses to neat, straight lines. Construct forms for easy removal without hammering, wedging or prying against concrete.

C. Space clamps, ties, hangers and other form accessories so that working capacities are not exceeded by loads imposed from concrete or concreting operations.

D. Build openings into vertical forms at regular intervals if necessary to facilitate concrete placement, and at bottoms of forms to permit cleaning and inspection.

E. Build in securely braced temporary bulkheads, keyed as required, at planned locations of construction joints.

F. Slope tie-wires downward to outside of wall.

G. Brace, anchor and support all cast-in items to prevent displacement or distortion.

H. During and immediately after concrete placing, tighten forms, posts and shores. Readjust to maintain grades, levels and camber.

I. Concrete paving, Curbs, Curb and Gutters, Ramps:

1. Deep Joints: Install at locations indicated per the Architectural drawings, and so that the maximum distance between deep joints is 10 feet in any directions.

2. Expansion Joints: Install at locations indicated, and so that maximum distance between joints is 20' for exterior concrete unless otherwise shown. Expansion joint material shall be full depth of concrete section. Recess for snap cap and sealant when required.

3. Curbs, Valley Gutter, and Curb & Gutter: Install expansion joints at 80' on center maximum with the expansion joints aligning with the expansion joints shown for the concrete walks. Expansion joint material shall be full depth of concrete section. Recess for snap cap and sealant when required. Deep joints shall also align for the curbs and sidewalks.

4. Isolation Joints: 3/8" felt between walls and exterior slabs or walks so that paved areas are isolated from all vertical features, unless specifically noted otherwise on plans.

5. Exterior Concrete Paving: Install expansion joints at 20' on center maximum, both directions, unless shown otherwise on plans.

6. Ramps; whether shown or not all ramps shall have control joints and expansion joints.

    a. Control joints on ramps shall be aligned and be placed in between with the vertical posts for the handrails. The curbs, if required shall have control joints that align with the handrail posts.

b. Expansion joints shall be placed at the upper, intermediate, and bottom landings.

3.5 FORM COATING

A. Before placement of reinforcing steel, coat faces of all forms to prevent absorption of moisture from concrete and to facilitate removal of forms. Apply specified material in conformance with manufacturer's written directions.

B. Before re-using form material, inspect, clean thoroughly and recoat.

C. Seal all cut edges.

3.6 INSTALLATION

A. General: Reinforcement shall be accurately placed at locations indicated on the drawings within required tolerances and providing required clearances. Reinforcement shall be secured prior to placement of concrete such that tolerances and clearances are maintained. Coverage shall be in accordance with Section 1907A.7 of the CBC. Keep a person on the job to maintain position of reinforcing as concrete is placed. Reinforcement must be in place before concreting is begun. Install dowels as shown on drawings. Give notice whenever pipes, conduits, sleeves, and other construction interferes with placement; obtain method of procedure to resolve interferences. All expansion and construction joints in concrete shall have dowels of size and spacing as shown, or as approved by Architect.

B. Placing Tolerances:

1. Per ACI 301 or CRSI/WCRSI Recommended Practice for Placing Reinforcing Bars, unless otherwise shown.

2. Clear distance between parallel bars in a layer shall be no less than 1", the maximum bar

3. diameter not 1 ½ times the maximum size of coarse aggregate.

C. Splices:

1. General: Unless otherwise shown on drawings, splice top reinforcing at midspan between supports, splice bottom reinforcing at supports and stagger splices at adjacent splices 5 foot minimum. Bar laps shall be wired together. Reinforcing steel laps shall be as follows:
   a. Lap splices in concrete: Lap splice lengths shall not be less than 62 bar diameter for No. 5 bar, 56” minimum for No. 6 bars. No. 4 bar shall have a minimum of 24” splice. 93 bar diameters for No. 7 bars and larger.
   b. Lap splices in CMU: Lap splice lengths not less than 75 bar diameters; 40” minimum, unless otherwise shown. Bars of size #8 and larger shall be spliced by welding or by approved mechanical connectors. Mechanical connectors shall develop 125% of the specific yield strength of the bar in tension. See Article 3.02D.1.c for welded splice requirements.
   c. All splices shall be staggered at 5 feet minimum.

3.7 INSPECTION

A. Approval of reinforcing steel, after installation, must be received from Inspector. Architect, Structural Engineer and County inspector must be notified 48 hrs. in advance of beginning of concrete placement operations.

3.8 PLACING OF CONCRETE

A. Adjacent finish surfaces shall be protected at all times during the concrete pour and finishing. Verify that all formwork is tight and leak-proof before concrete is poured. Finish work defaced during the concrete pour and finishing shall be replaced at no extra cost to the owner.

B. Transport concrete from mixer to place of final deposit as rapidly as practicable by methods which will prevent separation or loss of ingredients. Deposit as close as practicable in final position to avoid re-handling or flowing. Partially hardened concrete must not be deposited in work. Concrete shall not be wheeled directly on top of reinforcing steel.

C. Placing: Once started, continue concrete pour continuously until section is complete between predetermined construction joints. Prevent splashing of concrete onto adjacent forms or reinforcement and remove such accumulation of hardened or partially hardened concrete from forms or reinforcement before work proceeds in that area. Free fall of concrete shall not to exceed 4'-0" in height. If necessary, provide lower openings in forms to inject concrete and to reduce fall height.

D. Remove form spreaders as placing of concrete progresses.

E. Place footings as monolithic and in one continuous pour.

F. Keep excavations free of standing water, but moisture condition sub-grade before concrete placement.

G. Compacting: All concrete shall be compacted by mechanical vibrators. Concrete shall be thoroughly worked around reinforcement and embedded fixtures and into corners of forms. Vibrating shall not be applied to concrete which has already begun to initially set nor shall it be continued so long as to cause segregation of materials.

H. Concrete Paving:
   1. All concrete paving shall be formed and finished to required line and grades. Concrete paving shall be true and flat with a maximum tolerance of 1/8" in 10’for

flatness. Concrete paving which is not flat and are outside of the maximum specified tolerances shall be made level by the Contractor at no additional expense to the Owner.

2. Thoroughly water and soak the concrete paving subgrade as required to achieve required moisture content prior to the concrete pour. Provide damming as required to keep water within the formed area and to allow for proper saturation of the subgrade. for non-expansive soils, use the following paragraph regarding exterior flatwork subgrade preparation. Verify soil type and appropriate preparation measures with the soils report, soils engineer and civil engineer.

3. Concrete vibrator shall be used to assist concrete placement. Contractor shall have spare concrete vibrator on site during concrete placement.

4. Thoroughly water and soak the subgrade of exterior concrete paving, curbs, curb and gutters, with multiple daily waterings for at least three (3) days or as required.

I. Placing in hot weather: Comply with ACI 305R-91. Concrete shall not exceed 85 degrees F at time of placement. Concrete shall be delivered, placed and finished in a sufficiently short period of time to avoid surface dry checking. Concrete shall be kept wet continuously after tempering until implementation of curing compound procedure in accordance with this specification.

J. Placing in cold weather: Comply with ACI 306R-02. Protect from frost or freezing. No antifreeze admixtures are permitted. When deposited concrete during freezing or near-freezing weather, mix shall have temperature of at least 50 degrees F but not more than 90 degrees F. Concrete shall be maintained at temperature of at least 50 degrees F for not less than 72 hours after placing or until it has thoroughly hardened. Provide necessary thermal coverings for any flat work exposed to freezing temperatures.

K. Horizontal construction joint: Keep exposed concrete face of construction joints continuously moist from time of initial set until placing of concrete; thoroughly clean contact surface by chipping entire surface not earlier than 5 days after initial pour to expose clean hard aggregate solidly embedded, or by approved method that will assure equal bond, such as green cutting. If contact surface becomes contaminated with soil, sawdust or other foreign matter, clean entire surface and re-chip entire surface to assure proper adhesion.

3.9 CONCRETE FINISHES

A. Concrete Paving Finishing: Finish surface as required by ACI 302.1R. Use manual screeds, vibrating screeds to place concrete level and smooth. Use “jitterbugs” or other special tools designed for the purpose of forcing the course aggregate below the surface leaving a thick layer of mortar 1 inch in thickness. After tamping the concrete, wood float surface to a true and even plane. After floating with a wood bull float, make 2 passes with a steel Fresno trowel to start sealing the concrete surface. While concrete is still wet but sufficiently hardened to bear a persons weight on knee boards, start troweling with a steel hand trowel or a machine trowel in larger areas. Use sufficient pressure to bring moisture to surface. After surface moisture has disappeared, finish concrete utilizing steel, hand or power trowel. Surface shall be free from trowel marks, depressions, ridges or other blemishes. Tolerance for flatness shall be 1/8" in 10'. Provide final finish as follows:

1. Flatwork, medium broom finish: Typical finish to be used at all exterior walks, stairs and ramps. Brooming direction shall run perpendicular to slope to form non-slip surface.

2. Under no circumstances can water be added to the top surface of freshly placed concrete.

B. Curb Finishing: Steel trowel with light broom finish.

C. Joints and Edges: Mark-off exposed joints, where indicated, with ¼" radius x 1" deep jointer or edging tool. Joints to be clean, cut straight, parallel or square with respect to concrete walk edge. Tool all edges of control joints, walk edges, and wherever concrete walk adjoins other material or vertical surfaces. Expansion joints shall be constructed as detailed on plans.

1. The expansion joints shall be full depth as shown in the plan details. Failure to do so will result in non-compliance and shall be immediately machine cut by the contractor at his expense.

D. Exposed Concrete Surface Finishing (not including top surface of flatwork and curbs): Remove fins and rough spots immediately following removal of forms from concrete which is to be left exposed. Damaged and irregular surfaces and holes left by form clamps and sleeves shall be patched with grout. Tie wires are to be removed to below exposed surface and holes pointed up with neat cement paste similar to procedure noted under "Patching" below. Removal of tie wires shall extend to distance of 2" below established grade lines. Ends of tie wires shall be cut off flush at all other, unexposed locations. Care shall be taken to match adjacent finishes of exposed concrete surface. After patching, all concrete that is to remain exposed, shall be sacked with a grout mixture of 1-part cement, 1 1/2-parts fine sand and sufficient water to produce a consistency of thick paint. After first wetting the concrete surface, apply mixture with a brush and immediately float entire surface vigorously using a wood float. Keep damp during periods of hot weather. When set, excess grout shall be scraped from wall with edge of steel trowel, allowed to set for a time, then wiped or rubbed with dry burlap. Entire finishing operation of any area shall be completed on the same day. This treatment shall be carried to 4" below grade, and all patching and sacking shall be done immediately upon removal of the forms.

E. Stair Treads and Risers: Tool exterior stair tread and landing nosings per disabled accessible requirements in the California Building Code and as detailed. Paint every tread and landing nosing. Nosings shall contain no pockets, voids or spalls. Patching is not allowed. Damaged nosings shall be replaced.

3.10 CURING

A. Cured Concrete in Forms: Keep forms and top on concrete between forms continuously wet until removal of forms, 7 days minimum. Maintain exposed concrete in a continuous wet condition for 14 days following removal of forms.

B. Concrete paving, Curb, Curb and gutter, Valley Gutter: Cure utilizing Curing Compound. If applicable, the Contractor shall verify that the approved Curing Compound is compatible with the approved colorant system. Upon completion of job, wash clean per manufacturer's recommendations.

1. Curing compound shall be applied in a wet puddling application. Spotty applications shall be reason for rejection and possibly concrete removal and replacement at the contractor's expense with no compensation from the owner.

C. Concrete paving, Curb, Curb and gutterNo Curing Compound shall be applied to areas scheduled to receive resilient track surface including, curbs, ramps, run ways, etc.

3.11 DETECTIVE CONCRETE

A. Cured Concrete in Forms: Keep forms and top on concrete between forms continuously wet until Determination of defective concrete shall be made by the Architect or Engineer. His opinion shall be final in identifying areas to be replaced, repaired or patched.

B. The Owner reserves the right to survey the flatwork, if it is determined to be outside of the maximum tolerance for flatness. If the flatwork is found to be out of tolerance, then the Contractor will be required to replace concrete. The Contractor will be responsible for reimbursing the Owner for any surveying costs incurred. Determination of flatwork flatness, surveying and any remedial work must be completed far enough in advance so that the project schedule is maintained, delays are avoided and the new flatwork or flatwork repairs are properly cured.

C. As directed by Architect, cut out and replace defective concrete. All defective concrete shall be removed from the site. No patching is to be done until surfaces have been examined by Architect and permission to begin patching has been provided.

D. Defective concrete is:

1. Concrete that does not match the approved mix design for the given installation type.
2. Concrete not meeting specified 28-day strength.
3. Concrete which contains rock pockets, voids, spalls, transverse cracks, exposed reinforcing, or other such defects which adversely affect strength, durability or appearance.
4. Concrete which is incorrectly formed, out of alignment or not plumb or level.
5. Concrete containing embedded wood or debris.
6. Concrete having large or excessive patched voids which were not completed under Architect's direction.
7. Concrete not containing required embedded items.
8. Excessive Shrinkage, Traverse cracking, Crazing, Curling; or Defective Finish. Remove and replace if repair to an acceptable condition is not feasible.
9. Concrete that is unsuitable for placement or has set in truck drum for longer than 90 minutes from the time it was batched.
10. Expansion joint felt that is not isolating the full depth of the concrete section, and recessed as required for backer rod and sealant where required.
11. Concrete that is excessively wet or excessively dry and will not meet the minimum or maximum slump required per mix design.
12. Finished concrete with oil stains from equipment use, and or rust spots that cannot be removed.
13. Control joints (weakened planed joints) that do not meet the required minimum depth shown on the drawings.
14. Concrete that is cracked between control joints shall be removed as directed by the District, Architect, or Engineer.

E. Patching: Install specified Patching Mortar per manufacturer’s recommendations. REPAIRS TO DEFECTIVE CONCRETE WHICH AFFECT THE STRENGTH OF ANY STRUCTURAL CONCRETE MEMBER OR COMPONENT ARE SUBJECT TO APPROVAL BY THE ARCHITECT AND/OR ENGINEER.

3.12 CONCRETE TESTING

A. Comply with CBC Section 1903A, 1905A.3, 1916A and as specified in B. below. Costs of tests will be borne by the Owner.

B. Four identical cylinder samples for strength tests of each class of concrete placed each day shall be taken not less than once a day, or not less than once for each 50 cubic yards of concrete, or not less than once for each 2,000 square feet of surface area for slabs or walls. In addition, samples for strength tests for each class of concrete shall be taken for seven-day tests at the beginning of the concrete work or whenever the mix or aggregate is changed.

C. Strength tests will be conducted by the Testing Lab on one cylinder at seven (7) days and two cylinders at twenty-eight (28) days. The fourth remaining cylinder will be available for testing at fifty-six
(56) days if the 28-day cylinder test results do not meet the required design strength.

D. On a given project, if the total volume of concrete is such that the frequency of testing required by paragraph B. above would provide less than five strength tests for a given class of concrete, tests shall be made from at least five randomly selected batches or from each batch if fewer than five batches are used.

E. Cost of retests and coring due to low strength or defective concrete will be paid by Owner and back-charged to the Contractor.

F. Each truck may be tested for slump before concrete is placed.

3.13 REMOVAL OF FORMS

A. Remove without damage to concrete surfaces.

B. Sequence and timing of form removal shall insure complete safety of concrete structure.

C. Forms shall remain in place for not less than the following periods of time. These periods represent cumulative number of days during which temperature of air in contact with concrete is 60 degrees F and above.

1. Vertical forms of foundations, walls and all other forms not covered below: 5 days.
2. Concrete paving edge screeds or forms: 7 days.

D. Concrete shall not be subjected to superimposed loads (structure or construction equipment) until it has attained its full design strength and not for a period of at least 21 days after placing. Concrete systems shall not be subjected to construction loads in excess of design loads.

3.14 SEALANT

A. Sealant Application: Apply sealant in compliance with manufacturer's application instructions, using hand guns or pressure equipment with proper nozzle size, on clean, dry, properly prepared substrates. Force sealants into joint against sides of joint to make uniform. Avoid pulling of the sealant from the sides. Fill sealant space completely with sealant. Finished joints shall be straight, uniform, smooth, and neatly finished. Remove any excess sealant from adjacent surfaces of joint utilizing the manufacturer's recommended solvent and cleaning processes. Leave the work in a neat, clean condition.

3.15 CLEANING

A. Upon completion of work of this Section promptly remove from the working area all scraps, debris and surplus material of this Section.

B. Clean excess material from surface of all concrete walks and utility structures.

C. Power wash all concrete surfaces to remove stains, dried mud, tire marks, and rust spots.

END OF SECTION 32 16 00

SECTION 32 84 00 IRRIGATION

PART 1 GENERAL

1.1 SUMMARY

A. Scope of Work: Provide complete irrigation system to provide water necessary to sustain planting in healthy condition.

B. Furnish all labor, materials, equipment, facilities, transportation, and services to complete the irrigation system modifications and related work as shown on the Drawings and specified herein.

C. Related Sections:

1. General and Project Conditions of the Bid Documents
2. Section 31 23 33 Utility Trenching, Backfilling and Compacting
3. Section 32 90 00 Planting

1.2 SUBMITTALS

A. Submit the following to the Owner's Representative and Landscape Architect for review and approval prior to the purchase and delivery to the project site:

1. One (1) PDF copy of Materials List of all products specified.
2. One (1) PDF copy of the Product Data or "cut sheets" of all products specified. The Landscape Architect shall permit no substitutions without written acceptance. Cut sheets or manufacturer's technical data sheets to include the manufacturer, model number, and options (if any) for all equipment proposed.
3. One (1) PDF copy of Irrigation equipment layout (if different from the approved drawings). This shall include layout of all automatic controllers, wiring and electrical locations.

B. Submit the following at project close-out to the Owner's Representative and the Landscape Architect:

1. Irrigation plan and hydrozone map: Two (2) sets of these shall be produced (reduced to 11" x 17"), one (1) laminated in 5 mil. clear plastic for placement at or within the irrigation controller cabinet and one (1) for inclusion in the Operational and Maintenance Data Binder (below). Irrigation controller diagrams shall utilize As-Built/Record Drawings as a foundation. Ones shall be identified by number and varying colors. Colors shall not be duplicated on any one sheet.
2. Both sets shall indicate the location of all controls, piping, heads (including type), valves and connection to water service. All as-built information is to be accurately included. Each valve zone lateral line layout shall be color-coded so as to be readily distinguished between adjacent zones. The valve size, station number and gallons per minute shall be legible at each valve and shall match how the controller is wired. Additionally, each valve shall be annotated to describe which type of irrigation it is, i.e.: spray, rotor, bubbler, etc.
3. Irrigation schedules: Two (2) sets shall be produced (reduced to 11" x 17"), one (1) laminated in 5 mil. clear plastic for placement at or within the irrigation controller cabinet and one (1) for inclusion in the Operational and Maintenance Data Binder (below). Irrigation schedule to be created after soil analysis has been perform (post mass-grading) and programmed into controller prior to project close out.
4. Receipts (PDFs) for soil amendments matching soil analysis recommendations confirming delivery to site.

5. Operational and Maintenance Data: Submit one (1) copy of irrigation plan and zone map (see above), approved product cut sheets, and Landscape Certificate of Completion (to be provided by the Landscape Architect upon final acceptance) in a three-ring binder, labeled and indexed.

C. Additional items & equipment to be furnished:

1. Provide the following to the Owner's Representative prior to acceptance:

a. Three sets of any special tools or keys required to access or operate any equipment installed.

b. One quick coupler key and hose swivel for every 10 (or fraction thereof) quick couplers installed.

1.3 QUALITY ASSURANCE

A. Unless otherwise specified, install all materials in accordance with manufacturer's recommendations.

B. All work is to be performed by a single licensed CA Contractor specializing in irrigation system installation.

C. Explanation of Drawings:

1. For design clarity, drawings are generally diagrammatic and not indicative of exact placement or quantities as may be required to complete the work. Any question as to the placement of equipment and line shall be resolved prior to installation.

2. For design clarity, drawings do not indicate all outlets, fittings, sleeves, or other material as may be required to complete the work. Contractor shall review the plans and investigate existing conditions and shall provide all material required to meet existing conditions and install a complete and functional system.

D. Prior to commencing work, Contractor shall:

1. Review the site and resolve all obstructions, conflicts, or discrepancies that may be present.

2. Verify the point of connection and available pressure and flow as indicated on the drawings.

3. Verify the electrical point of connection and coordinate work. (Permanent power connection is required for substantial completion.)

4. Verify sleeves (if indicated as existing).

1.4 COOORDINATION AND SCHEDULING

A. The Contractor shall be responsible for promptly scheduling and progressing the work so as not to delay the project, including:

1. Coordination with other trades as required.

2. Timing of work and coordinating (temporary and permanent) power, water, and other services or requirements.

3. Notifying the Owner's Representative of the following observations, with the advance time indicated:

a. Pressure and flow test at point of connection – 7 days

b. Mainline, control wire, and valve installation and testing – 14 days

c. Lateral line and sprinkler installation – 7 days

d. Coverage test – 7 days

e. Final Inspection – 7 days

1.5 GUARANTY

A. Conform to applicable Division One and Division Two specifications, General Conditions and Special Provisions.

B. Contractor shall provide a written guaranty covering entire system against defects in installation, workmanship and equipment for a period of one (1) year from date of Final Acceptance.

C. Contractor shall make necessary repairs to the system as well as to other work affected by defects in the system during guaranty period. Repairs shall be made at the Contractor's sole expense.

D. After the system is installed and approved, instruct groundskeeper personnel and maintenance staff in the complete operation and maintenance.

PART 2 PRODUCTS

2.1 GENERAL

A. Use only new materials of brands shown on Drawings, specified herein or as acceptable to the Owner's representative & Landscape Architect.

B. Plastic Pipe: All pipe and hose is free of blisters, internal striations, cracks or any other defects or imperfections. The pipe and hose are continuously and permanently marked with manufacturer's name, material type, size, schedule or class and quality control identifications.

2.2 PIPING MATERIALS

A. Polyvinyl Chloride (PVC) Pipe shall be made from National Sanitation Foundation (NSF) approved Type I, Grade I virgin PVC compound conforming to ASTM resin specification D1785. All PVC pipe shall bear the following marked continuously: Manufacturer's name, nominal pipe size, schedule or class, pressure rating in pounds per square inch (PSI), NSF approval, and date of extrusion.

1. Mainline (constantly pressurized) Pipe

   a. Mainline and sub-mains 3" and large: As specified on Drawings.

   b. Mainline and sub-mains 2 1/2" in diameter and smaller : As specified on Drawings.

   c. Mainline joints shall be minimized to the extent possible within sleeving.

2. Lateral Line Pipe

   a. Lateral lines shall be Class 200 up to 2". PVC Schedule 40 for lateral lines 2-1/2" and above. Fittings shall be PVC schedule 40 solvent weld, NSF approved.

B. Fittings

1. Plastic: Factory-threaded Schedule 80, Type 1, Grade 1 polyvinyl chloride (PVC) pipe, threaded both ends. Pipe shall be in conformance with ASTM D1784 and D1785. Color: Gray.

C. Nipples

1. Plastic: Factory-threaded Schedule 80, Type 1, Grade 1 polyvinyl chloride (PVC) pipe, threaded both ends. Pipe shall be in conformance with ASTM 1784 and D1785. Color: Gray.

D. Joint Restraints:

1. Class 350, AWWA C153 ductile iron joint restraints and/or restraining fittings shall be used for all mainline piping 4” and larger in diameter.
2. Thrust blocks are not allowed in lieu of joint restraints.

E. Copper pipe shall be type ‘K’, hard tempered seamless conforming to ASTM B88. Soldered joints shall comply with ASME B16.22. Flux shall conform to ASTM B 813, and solder shall conform to B 32. Cast fittings joints shall comply with ASME B16.18.

F. Galvanized Pipe and Fittings shall be schedule 40, threaded and hot dipped galvanized, complying with ASTM A53. Male end of threaded fittings shall be wrapped with three layers of PTFE tape. All Galvanized pipe and fittings installed below grade shall be wrapped with two layers of minimum 10 mil. pipe wrap.

G. Sleeves shall be as specified on the Drawings.

H. Conduit shall be rigid non-metallic PVC schedule 40 bell-end, conforming to ANSI/UL 651 and NEMA TC-2.

1. Elbows shall be long-sweep schedule 40 bell-end, conforming to ANSI/UL 651 and NEMA TC-3
2. Couplings, adapters, and fittings shall conform to UL 514B and NEMA TC-3.

I. Swing Joints: As specified on Drawings.

J. Solvent Cement: Compatible with PVC pipe and of proper consistency.

K. Connecting Compounds:

1. Primer: IPS Corporation Weldon #P70.
2. Cement: Conform to ASTM D2564.
3. IPS Corporation Weldon #705 for Class 200 PVC. Schedule 40 PVC (up to 6 inch diameter) and Schedule 80 PVC (up to 4 inch diameter) pipe IPS Corporation Weldon #711 shall be used for pipe diameters larger than 6 inches.
4. IPS Corporation Weldon #795 for flexible P.V.C. to rigid P.V.C. connections.

2.3 VALVES

A. Isolation (mainline) Valves

1. Valves shall be as specified on the Drawings and same size as the pipe they are installed on. An isolation valve shall be installed downstream of the backflow device, or if none, at the point of connection, whether shown on the plans or not.

B. Quick Coupling Valves (QC) shall be as specified on the Drawings. Valves shall have a brass two-piece body with a minimum working pressure of 125 psi and be operable with a standard quick coupler key.

C. Remote Control Valves (RCV) shall be as specified on the Drawings. Valves have a manual flow adjustment, fully potted solenoid, and include adjustable or pre-set pressure regulation option(s).

2.4 VALVE BOXES

A. Boxes for isolation valves, quick couplers, air release valve, and flow sensor shall be a

10” x 10- 1/4” round box with bolt-down lid. Extension sleeve shall be PVC with a minimum diameter of 6”.

B. Boxes for master valve, RCV’s, and drip filters shall be 9-1/2” x 16” x 11” rectangular box with bolt-down lid, and extensions as required. Use a separate valve box or jumbo valve box for drip control assemblies if required to allow disassembly and servicing of filter in box.

C. Boxes for drip flush valves and air relief valves shall be 7” or 6” round boxes with push-on lids.

D. Color: Valve boxes and lids shall be green for potable water applications and purple where required for reclaimed water designation.

E. Identification: Remote Control Valve box lids shall be heat-branded with the controller and valve number (e.g.: A13). Quick Coupling Valves shall be branded “QC.” Master Valves shall be branded “MV.” Isolation Valves shall be branded “IV.”

2.5 CONTROL WIRING

A. General: all wire shall be new, with wire and insulation intact and free of nicks and cuts.

B. Splice connectors: Shall be direct bury splice kits pre-filled with epoxy resin. Splice kit shall be designed to encapsulate a one wire connector, stable in applications at elevated temperatures up to 121 degrees C, and with a cure time of 24 hours at 70 degrees F. 3M "DBY" splice connectors or approved equal.

2.6 AUTOMATIC CONTROLLERS

A. Existing controllers to remain.

2.7 OVERHEAD EMITTER ASSEMBLIES

A. All emitters shall be as specified on the drawings, meet ASABE/ICC 802-2014 “Landscape Irrigation Sprinkler and Emitter Standard”, and shall have been documented by the manufacturer to achieve a distribution uniformity (low quarter) of 0.65 or higher using the protocol defined in the standard above.

B. All nozzles shall include radius adjustment features, excepting bubblers.

C. Rising-stem bodies shall include a molded wiper seal with UV resistant material and include internal pressure regulation.

D. Bodies with optional factory-installed check valves shall be installed as required to prevent low- head drainage.

E. All bodies shall be installed on swing arms with 360-degree adjustment in three planes, sized to the inlet of the body.

1. Swing shall be constructed of schedule 40 PVC street elbows, and schedule 80 threaded risers, minimum 6” in length. All threaded fittings shall be wrapped with a minimum of 4 wraps of Teflon tape.

F. When specified on pop-up bodies, bubbler nozzles shall fully retract into the body, and shall not require an adapter to thread onto the riser stem.

G. Multi-Stream, Multi-Trajectory Rotating (MSMTR) Nozzles shall include arc adjustment and radius adjustment to a minimum of -25% of catalog throw. As radius and arc are decreased, the volume of water shall proportionally decrease to achieve matched precipitation rates throughout the range of adjustment.

2.8 DRIP IRRIGATION

A. Root Zone Watering System: As specified on Drawings.

PART 3 EXECUTION

3.1 PREPARATION

A. Contractor shall review the site and confirm that all preceding work has been completed to allow installation of the irrigation system.

B. Verify water and electrical points of connection (services) and ensure they are adequate to serve the work. Notify the Landscape Architect immediately of any discrepancies.

C. Beginning work shall constitute acceptance of the site and suitability of services.

D. Irrigation plans are diagrammatic. Pipelines shown parallel in the Drawings may be placed in a common trench, provided that a minimum horizontal distance of three inches (3”) is maintained between buried lines.

3.2 INSTALLATION

A. Trenching: Provide the following minimum depths for all lines:

1. Mainline and control wiring: 24 inches, 30 inches under paving.
2. Lateral lines: 18 inches, 24 inches under paving.
3. Excavate trenches with vertical walls, uniform bottom, free of deleterious materials, and wide enough for pipes to lay side by side, fully supported on bottom. There shall be a minimum three-inch (3") clearance between all pipes.
4. No lines shall be installed parallel to and directly over another line.
5. When lines must cross, the angle shall be forty-five to ninety degrees, and a minimum of three inch (3") vertical clearance shall be maintained.
6. Hydraulic driving methods shall not be used under paved surfaces.

B. Bedding:

1. Mainlines shall have sand bedding, 3” deep.

C. Backfilling:

1. Backfilling shall not occur prior to all required observations and tests. Any lines covered prior to these shall be exposed at the contractor’s expense.
2. Initial backfill for mainline shall be 6” of sand.
3. Initial backfill for laterals shall be a fine granular material in a layer 6” deep, or covering the pipe to at least 2” in depth, whichever is greater. Native soil may be used for initial backfill, excepting that rocks, clods, and deleterious material 1/2” in diameter or greater shall be screened out.
4. Backfill shall be compacted to a density at least equal to undisturbed soil in planting areas. Settlement of trenches shall be deemed evidence of insufficient compaction and shall be corrected at the contractor’s expense, including adjustment of lines, heads, grades, and replacement of plant material.

D. Backfilling Under Paving:

1. Backfill shall consist of 6” of sand, then screened native material in 6” maximum lifts, compacted to 95% relative compaction. All trenches shall be left flush with the adjoining grade. As a part of irrigation work, contractor shall set in place and cap all sleeving under paving prior to paving work. If piping requires joints under

paving, all piping shall be laid, capped, and pressure tested prior to paving work.

2. Piping under existing walks shall be done by jacking or boring. Hydraulic driving shall be permitted only under pedestrian paving not exceeding four feet in length. Where cutting and patching is required, concrete shall be removed to the nearest control joint. New concrete shall match existing finish and color.

3.3 PIPING

A. Installation of all pipes and fittings shall be in strict accordance with the manufacturer's written specifications. Deviations from these specifications shall be permitted only with the written approval of the Owner's Representative.

B. Piping:

1. Install PVC pipe in dry weather when temperature is above 40° F in strict accordance with manufacturer's instructions.
2. Initially fill mainline slowly (maximum velocity 1 foot per second). Vent air from the mainline while filling. Thoroughly flush mainline prior to installing valves.
3. Pipe Clearance: all pipes 4" or greater shall have a minimum clearance of 6" from each other. All pipes 3" or less shall have a minimum clearance of 3" from each other.
4. Deflection for PVC pipe: Do not exceed a longitudinal bending radius of 300 times the pipe outside diameter or the manufacturer's rated deflection, whichever is less, for either solvent welded or gasketed pipe.
5. Mainline shall in all cases be looped or terminated in a thrust-restrained cap with a minimum of 12" offset to upstream fitting(s).

C. Pipe Assemblies:

1. PVC solvent welded joints: follow ASTM D2855, "Standard Practice for Making Solvent- Cemented Joints with Poly(Vinyl Chloride) (PVC) Pipe and Fittings".
2. Threaded joints: Do not use male inlet pipe thread (MIPT) adapters. All threaded PVC fittings shall be female end with schedule 80 nipples. Wrap nipple with 2 layers of Teflon thread tape prior to assembly. On PVC to metal connections, work metal connections first.
3. Use fittings to change pipe direction without exceeding deflection limits. For elevation changes, multiple 45 or 22.5 degree elbows shall be used. Do not use 90 degree elbows to change elevation.
4. Use minimum number of fittings required. Do not use multiple shorter lengths of pipe in lieu of one continuous piece.
5. Pipe may be assembled and welded on the surface. Snake pipe a minimum of one (1) additional foot per one hundred feet (100') of pipe to allow for expansion and contraction.
6. Connections between plastic pipe and metal valves shall be made using plastic male adapters and applying the recommended threaded joint compound.
7. Cap or plug openings as soon as pipes have been installed to prevent intrusions of debris.
8. Thoroughly flush system prior to installing valves and nozzles.
9. Install all irrigation and/or electrical sleeving as indicated on the Drawings. Contractor shall coordinate the installation of sleeving with the work of other trades

3.4 CONTROL WIRING

A. Wiring shall be installed in the same trench as and adjacent to but not on top of the mainline. Wire shall be bundled together and secured with electrical tape at 10 feet intervals.

B. Wiring shall be laid loosely in the trench and snaked from side to side to allow sufficient length for thermal expansion and contraction. Do not pull, stress, or stretch wires.

C. Provide an expansion curl (pigtail) within 3 feet of each wire connection, the greater of 18” or sufficient length to allow the valve to be raised 12” above the finished surface.

D. Field splices between the controller and the remote control valve shall not be permitted without prior approval of the Owner’s Representative.

E. All splices shall be made with dry electrical connectors within valve boxes.

F. Label all wires in the controller enclosure within 18” of the terminal strip with permanent tags wrapped around the wire, indicating the controller, and valve (for master valve/flow sensor wires).

3.5 VALVES

A. Remote Control Valve Assemblies, Quick Couplers, and Isolation Valves

1. Install in approximate locations shown on drawings, but in planter areas instead of turf areas wherever possible, and as shown in the details. Valve boxes shall be perpendicular to adjacent walls, walks, or headers, and shall be parallel to each other.

2. Each valve shall be identified with a minimum 2” x 2-3/4” yellow (or purple, for non-potable applications) polyurethane I.D. tag attached to the control wire of the valve.

3.6 OVERHEAD EMITTERS/SPRINKLER ASSEMBLIES

A. Install as detailed in the drawings. Where adjacent to headers or hard surfaces, locate such that edging equipment can pass between the adjacent edge and emitter without damage to either.

B. In no case shall spacing exceed the manufacturer’s listed thrown. Single-stream rotors shall be installed at a spacing of 80% or less of the manufacturer’s listed throw.

C. Install plumb with finish grade.

D. Thoroughly flush all lines prior to intsalling nozzles.

3.7 FIELD QUALITY CONTROL

A. The mainline and all piping under paving shall be simultaneously pressure and leak tested. Contractor shall furnish force pump and all necessary equipment. Sufficiently brace piping to prevent movement while testing. If concrete thrust blocking is used, allow blocking to sufficiently cure. Restrain ends of mainlines. Ensure all air is removed from mainline prior to testing.

1. Test with a hydrostatic pressure of 120 psi, or 150% of the operating pressure (sustained mainline pressure), whichever is greater.

2. Observe pressure using a minimum of two gauges, at opposite ends of the mainline. Pressure shall not vary by more than 5 psi during the test.

3. Pressure shall be sustained for a minimum of two hours. If leaks are visible or pressure drops by more than 5 pounds, replace joints and retest.

B. Irrigation system shall be operated in its entirety and shall be adjusted for complete coverage, proper operation, and to reduce or eliminate overspray and water hammer. Adjustments may include:

1. Pressure regulating devices, whether stand-alone or integrated with remote control valves.

2. Manual flow adjustment of each remote control valve.
3. Arc and radius adjustment of each nozzle.
4. Substitution of variable arc nozzles or reduced radius nozzles if required.

C. The irrigation system, including controller, shall be operable prior to planting.

3.8 CLEAN UP

A. All materials and debris accumulated in conjunction with completing this Work, including trash, excess soil, and empty plant containers, shall be legally recycled or disposed of by Contractor off site.

B. All scars, ruts or other marks in the ground caused by this work shall be repaired and the ground left in a neat and orderly condition throughout the site.

C. The Contractor shall leave the site area broom-clean and shall wash down all walkways and other paved areas, leaving the premises in an excessively neat, clean, and safe condition.

D. Promptly remove soil, debris, or marks created by work from paved areas, buildings, site furnishings, and other appurtenances.

E. Clean vehicle tires before leaving site to avoid tracking soils onto paved areas.

END OF SECTION 32 84 00

SECTION 32 90 00 PLANTING

PART 1 GENERAL

1.1 SUMMARY

A. Scope of Work: Provide landscape planting, complete in place, as shown and specified including: removal of rock, gravel and other construction related material, sub-grade treatment, soil replacement, rough grading, soil amendment and preparation, finish grading, planting, staking, clean-up, and maintenance.

B. Related Sections:

1. General and Project Conditions of the Bid Documents
2. Section 32 84 00 Irrigation
3. Section 32 01 90 Operation and Maintenance of Planting

1.2 SUBMITTALS

A. Submittals shall include but not be limited to the following:

1. Topsoil, Amendments, including fertilizers: Product data including chemical and physical composition, sieve, plasticity, and analytical reports from an approved laboratory source illustrating compliance with industry standards and manufacturer's stated data.
2. Mulch: size, type, and source of material, including data demonstrating compliance with physical and chemical characteristics required herein.
3. Soils fertility testing report(s) (after rough grading). Report(s) to include the following:
   a. percentage of organic matter,
   b. salinity,
   c. pH.
   d. micro and macro mineral nutrients, including concentrations of nitrogen, phosphorus, potassium, calcium, and magnesium,
   e. potential hazards of impediments to plant growth from salinity; sodium, boron, impaired soil structure or drainage,
   f. written recommendations for soil amendment application rates, and
   g. infiltration rates.
   h. Soil Texture
4. Schedule indicating anticipated dates for plant delivery, inspections, reviews, and planting.
   a. Provide documentation at least 60 days before planting certifying that all plant material is available, listing sources of materials.
   b. Contractor is responsible for securing all material in a timely manner so as not to disrupt overall project schedule and allowing for customs and agricultural inspection (if necessary) for materials that may not be locally available.

B. Quality Assurance Submittals:

1. Plants shall be subject to inspection and approval by Owner's Representative at place of growth or upon delivery for conformity to specifications. Such approval shall not impair the right of inspection and rejection during progress of the work. The health and vigor of the plant material is the sole responsibility of Contractor.

2. Owner's Representative may request delivery tags for bulk materials and receipts for other materials.

1.3 PRODUCT DELIVERY, STORAGE AND HANDLING

A. Delivery

1. Deliver all packaged and/or manufactured products to the site in unopened containers bearing manufacturer's guaranteed chemical analysis.
2. Deliver all plants with legible identification labels.
   a. Label trees, shrubs, bundles of plants, or groundcover plants.
   b. Include correct botanical genus, species, and cultivar indicated on plant list.
   c. Use durable labels with water- and UV- resistant ink which will remain legible for at least sixty days.
3. Transport plants in enclosed or covered conveyances. Protect plant material during delivery and while temporarily stored to prevent damage to root ball and leaves, including, if necessary, application of anti-desiccants.
4. Seed: Deliver seed in original sealed, labeled, and undamaged containers.

B. Storage

1. Store plant material in shade and protect from weather.
2. Maintain and protect plant material not to be planted within 4 hours of delivery in a healthy, vigorous condition.
3. Store seed, mulch, fertilizer, and other products with protection from weather or other conditions that would damage or impair the effectiveness of the product.

C. Handling

1. Contractor is cautioned to exercise care in handling, loading, unloading, and storing of plant materials. Plant materials that have been damaged in any way shall be discarded and shall be replaced with undamaged materials at the Contractor's expense.

1.4 COORDINATION AND SCHEDULING

A. Perform planting only when weather and soil conditions are suitable in accordance with standards of industry.

B. Scheduling: Install trees, shrubs, and liner stock plant material after irrigation system is installed and inspected, after soil amendments have been incorporated and finish grades have been achieved, and before wood mulch is spread.

C. Observation Schedule. Contractor shall notify Owner's Representative in advance for the following site visits, according to the time indicated:

1. Plant material review or tagging at growing site - notify Owner's Representative at least 30 days before planting.
2. Pre-job conference - 7 days.
3. Final grade and soil preparation review - 48 hours.
4. Plant material, plant layout, and planting operation review – 3 days.
5. Pre-maintenance - 7 days.
6. Final acceptance - 7 days.

1.5 SAMPLES AND TESTS

A. Owner's Representative reserves the right to take and analyze samples of materials for conformity to specifications at any time. Contractor shall furnish samples upon request. Rejected materials shall be immediately removed from the site at Contractor's expense. Cost of testing of materials not meeting specifications shall be paid by Contractor.

B. Contractor shall arrange for a soil fertility analysis by a certified soil testing laboratory after rough grading operations are complete. At minimum, provide one test of each source of imported soil, four tests of soil at a depth of 4-6 inches for turf areas, and six tests of soil at a depth of 8-12" for shrub and groundcover areas.

1.6 GUARANTEE AND REPLACEMENT

A. All plants and other materials installed shall be guaranteed against any and material failures, decline, and/or workmanship for the duration of the maintenance period. Any plant found to be dead or not in a satisfactory or healthy condition due to faulty materials, workmanship, natural occurrences, or improper maintenance shall be replaced immediately by the Contractor at no additional expense to the Owner.

B. The Owner's Representative shall be the sole judge as to the condition of plants and other materials. Material to be replaced within the guarantee period shall be replaced by the Contractor within twenty days of written notification by the Owner. All replacement materials and installation shall comply with the Drawings and Specifications.

PART 2 PRODUCTS

2.1 GENERAL

A. Specific amendments and fertilizer amounts will be determined after rough grading operations are complete and soil fertility test results are provided by the Contractor and approved by the Owner's Representative. The amounts listed in the Preparation section are considered minimum amounts for the project unless directed otherwise.

2.2 PLANTING SOIL CONDITIONER

A. Gro-Power Plus (no known equal): Humus (bacteria included based fertilizer and soil conditioner with soil penetrant shall consist of the following percentages by weight: 5% nitrogen, 3% phosphoric acid, 1% potash, 50% humus, and 15% humic acids.

2.3 PLANTING ORGANIC AMENDMENT

A. Organic amendment shall be nitrogen stabilized composted wood residual or compost containing:
0.56 to 0.84 percent N based on dry weight.

B. Particle Size: 95 - 100 percent passing 6.35 mm standard sieve, 80 - 100 percent passing 2.33 mm standard sieve

C. Iron Content: Minimum 0.08 percent dilute acid soluble Fe on dry weight basis.

D. Ash: 0-6.0 percent (dry weight).

2.4 SOIL AMENDMENTS

A. Soil Sulfur: Agricultural grade sulfur containing a minimum of 99 percent sulfur (expressed as elemental).

B. Iron Sulfate: 20 percent Iron (expressed as metallic iron), derived from ferric and ferrous sulphate, 10 percent sulfur (expressed as elemental).

C. Calcium Carbonate: 95 percent lime as derived from oyster shells.

D. Gypsum: Agricultural grade product containing 98 percent minimum calcium sulphate.

2.5 FERTILIZER

A. General Fertilizer: Pelleted or granular form shall consist of the following percentages by weight and shall be mixed by commercial fertilizer supplier: 16 percent nitrogen, 6 percent phosphoric acid, and 8 percent potash.

2.6 LANDSCAPE TOPSOIL

A. On-site stripped and stockpiled topsoil (if any) shall be considered suitable for planting upon receipt of a soil fertility analysis. Imported soil shall be of a sandy-loam texture, free of refuse, roots or other un-decomposed whole organic material, parasitic nematodes, rocks, clods, clay, or other deleterious material. A minimum of one soil fertility test shall be supplied for each source prior to import.

B. Particle Size:

CLASS	PARTICLE SIZE	MAX. % WT.	MIN. % WT.
Coarse Sand	0.5-2.0 mm	15	0
Silt Plus Clay	< 0.05 mm	50	25
Silt	0.002 - 0.05 mm	30	10
Clay	0 - 0.002 mm	25	10
Gravel	2 - 13 mm	15	
Rock	> 1/2 inch	10% by volume, none > 1 inch	0
Organic Matter		15	0

C. The pH of saturated paste shall be between 5.5 and 7.5 without high qualitative lime content. The sodium absorption ratio (SAR) shall not exceed 6 and the electrical conductivity (ECe) of the saturation extract of this soil shall not exceed 3.0 milliohms per centimeter at 25 degrees centigrade. The boron content shall be no greater than one part per million as measured on the saturation extract.

2.7 PLANT MATERIAL

A. Plants shall be in accordance with the California State Department of Agriculture's regulation for nursery inspections, rules, and rating. All plants shall have a normal habit of growth and shall be sound, healthy, vigorous, and free of insect infestations, weeds, plant diseases, sun scalds, fresh abrasions of the bark, excessive abrasions, or other objectionable disfigurements. Tree trunks shall be sturdy and have well "hardened" systems and vigorous and fibrous root systems that are not root or pot bound.

B. Root conditions of the plants provided by Contractor in containers will be determined by removal of earth from the roots of not less than two plants or more than 2 percent of the total number of plants of each species or variety. Where container-grown plants are from several sources, the roots of not less than 2 plants of each species or variety from each source, will be inspected. In case the sample plants inspected are found to be defective, the City’s Representative reserves the right to reject the entire lot or lots of plants represented by the defective samples.

C. The size of the plants shall correspond with that normally expected for species and variety of commercially available nursery stock, conforming to ANSI Z60.1, “American Standard for Nursery Stock,” or as shown on the Drawings, whichever is greater. The minimum acceptable size of all plants measured before pruning with the branches in normal position. Plants larger in size than specified may be used without prior approval.

D. All plants not conforming to the requirements herein specified, shall be considered defective and such plants, whether in place or not, shall be marked as rejected and immediately removed from the site of the Work and replaced with new plants at the Contractor's expense.

E. Pruning: At no time shall trees or plant materials be pruned, trimmed or topped prior to delivery and any alteration of their shape shall be conducted only with the approval and when in the presence of the Owner's Representative.

F. Trees specified as multi-trunked shall have at least three primary leaders from the base of the tree. Trees not otherwise specified shall straight, single trunks, with even branching, no split crotches, co-dominate leaders, or closely spaced branches, and shall have a central leader that has not been cut, bent, scared, or broken.

G. Plant material shall be true to botanical and common name and variety as specified in "Annotated Checklist of Woody Ornamental Plants in California, Oregon and Washington," published by the University of California School of Agriculture (1979).

H. Nursery Grown Stock shall be grown under climatic conditions similar to those of the project. Container stock shall be in vigorous, healthy condition, not root-bound or with root system hardened off. Liner or flat plant material shall be well established in removable containers with roots sufficiently developed to hold homogenous soil sections.

2.10 STAKING MATERIALS

A. Tree stakes: round and uniform with chamfered top and conical point, two-inch diameter, 8 or 10 foot length as required for height of tree, Lodgepole Pine or Douglas Fir, treated for resistance to decay with Alkaline Copper Quaternary (ACQ) or Copper Azoles (CA-B). Stakes treated with arsenic or chromium compounds will be rejected.

B. Tree Ties: Vinyl impregnated Nylon or Vinyl, black, 1" wide, UV resistant, waterproof, tensile strength 300 pounds, bursting strength 300 psi. 24" for trees 15 gallons and smaller, 32" length for 36" box to 48" box trees. Tree ties shall be Arthur Enterprises "Super Tree Tie", V.I.T. Enterprises "Cinch Tie", or equal.

C. Tree Guys: 18 gauge, six-strand galvanized steel wire with minimum 2 x 2 x 18" long treated stakes

2.11 WATER

A. Provide or use only from approved water source.

2.12 MULCH

A. Shall be "wood chip mulch" available from green waste recyclers.

B. The mulch shall consist of fibrous, woody mixture of varied size, maximum 3", with the following characteristics:

1. Physical Properties:

Percent Passing	Sieve Size
90-100	1-inch diameter
80-100	1/2-inch diameter
20-60	1/4-inch diameter

2. Chemical Properties:

a. Acidic, maximum pH 5.0
b. Maximum ash 7% based on dry weight
c. Minimum moisture content 30% at time of delivery based on fresh weight.

2.13 TREE ROOT BARRIERS

A. As specified and/or shown on the Drawings.

2.14 SAND

A. Shall be fill sand with 100% passing a #4 screen, 85% passing a #8 Screen and less than 4% passing a #200 screen.

1. Quantities: Sports Fields: 2.5" compacted.
2. Order quantities based on 1.35 tons per cubic yard.

B. Pre- approved suppliers (or equal):

1. West Coast Sand & Gravel: contact JR, 916-386-8177
2. TMT. Contact Matt Moore, 408-432-9040
3. CL Smith, Woodland, California. Contact: Doug 530-662-2633

PART 3 EXECUTION

3.1 INSPECTION

A. Verify that that planting soils have been cleared of all construction debris, including gravel, concrete, concrete washout, paints, asphalt, etc.

B. Verify that final grades have been established to within 1/10 foot prior to commencing planting operations. Provide for inclusion of all amendments, settling, etc. Contractor shall be responsible for finish grading, including shaping all planting areas, including swales and basins, as indicated on Drawings.

C. Lime treated soils shall be considered unsuitable for planting and shall be removed from all planting areas to a depth of 24" or the depth of treatment, whichever is greater, and replaced with topsoil.

D. Prior to planting, inspect trees, shrubs and liner stock plant material for injury, insect infestation and trees and shrubs for improper pruning.

3.2 SOIL PREPARATION

A. Pre-plant Weed Control

1. If live perennial weeds exist on site at the beginning of work, spray with a non-selective systemic contact herbicide, as recommended and applied by an approved licensed landscape pest control advisor and applicator. Leave sprayed plants intact for at least 15 days to allow systemic kill. Clear and remove these existing weeds by mowing or grubbing off all plant parts at least 1/4 inch below the surface of the soil over the entire area to be planted.
2. After irrigation system is operational, apply water for 5 to 10 days as needed to achieve weed germination. Apply contact herbicides and wait as needed before planting. Repeat, if required by Owner's Representative.

B. Soil Amendment

1. After approximate finished grades have been established, hardened or previously unworked areas shall be broken up by ripping, an excavator, or other suitable equipment to a minimum depth of eight inches.
2. Soil amendments shall be uniformly spread and cultivated thoroughly using a mechanical tiller into the top 6 inches of soil. Areas around existing plants to remain shall be cultivated with hand tools.
3. The following amendment rates establish minimum requirements per 1,000 square feet and are listed for bidding purposes. Specific amendments and fertilizer amounts will be determined after rough grading operations are complete and soil samples are tested by the Contractor and approved by the Owner's Representative. The amounts listed below are considered minimum amounts for the project,

regardless of soils fertility reports, unless directed otherwise by the Owner's Representative.

a. Nitrogen stabilized organic amendment – 3 cubic yards
b. Planting fertilizer - 18 lbs.
c. Soil Conditioner – 150 lbs.
d. Gypsum - 200 lbs.
e. Soil sulfur - 20 lbs.
f. Iron – 2 lbs.
g. Calcium carbonate – 2 lbs.
h. For annual color areas, in addition to the above, incorporate 3 cubic yards organic amendment and 20 cubic feet of Perlite.

C. Final Grades:

1. Remove all rocks, whole organic materials (roots, stumps, etc.), construction debris, or other deleterious materials 1" or greater from the top 6" of soil in planting areas.

2. Fine grades below adjacent paved areas, sidewalks, valve boxes, headers, clean-outs, drains, manholes, etc. shall be as follows: hydroseeded areas, ½ inch; sodded areas, one inch; shrub and groundcover planting areas, 1/2 inch plus the depth of mulch indicated on Drawings below adjacent improvements.

3. Final grading shall ensure proper drainage of the site, with positive surface flow to all catchment inlets, areas, and structures. Surface drainage shall be away from all building foundations.

4. All planting areas shall be compacted and settled by application of heavy irrigation or light roller to a minimum depth of twelve inches.

5. Minor excess soil may be incorporated into planting areas to form minor berms not exceeding slopes of 12:1 without prior approval. Dispose of any unacceptable materials or excess soil legally at an offsite location at no additional expense to the owner.

3.3 PLANT INSTALLATION

A. Only as many plants as can be planted and watered on that same day shall be distributed in a planting area.

B. Layout of Major Plantings: Locations for trees and outlines of areas to be planted shall be marked on the ground by Contractor before any plant pits are dug. All such locations shall be approved by the Owner's Representative. If underground construction or a utility line is encountered during excavation of planting pits, other locations for planting may be selected by the Owner's Representative. Layout shall be accomplished with flagged grade stakes indicating plant names and specified container size on each stake.

C. Planting of Trees and Shrubs:

1. Planting Pit Preparation

a. Excavation for planting shall include the stripping and stacking of all acceptable topsoil encountered within the areas to be excavated for trenches, tree holes, plant pits and planting beds.

b. Protect all areas from excessive compaction when trucking plants or other material to the planting site.

c. All excavated holes shall have vertical sides and shall be of a size that is three times the diameter and 1 and 1/2 times the depth of the root ball for all trees and shrubs. After pits are dug, roughen the sides of the pit, and loosen soil in the bottom of the pit to a depth of 3 inches. Construct foot-tamped mound in the bottom of the pit to support the plant at the proper level.

2. Hardpan Conditions:
   a. Where hardpan exists, whether it is in the form of caliche or other impervious clay, and it is within the top 2 and 1/2 feet of soil, use powered equipment to break through completely at each tree location to allow drainage and root growth. Remove hardpan at least one- and one-half feet greater than the root ball diameter of tree. Backfill with soil mix as specified.
   b. Where hardpan is within the first 12 inches of soil, it shall be completely penetrated for all shrubs and trees.
3. Rock Conditions:
   a. Where rock is encountered, tree planting pits shall be extended in the direction of the underlying rock slope until the bottom of the tree pit is in soil. Tree pits dug in rock shall not be accepted.
4. Percolation Testing and Remediation
   a. Percolation tests are required for all trees. Tree pits shall be filled with water and the drainage rate observed. Percolation rate shall be a minimum of the depth of the tree pit within 24 hours.
   b. If percolation/drainage rate is less, then tree pit drainage shall be installed. Refer to details and plans.
5. Plant Container Removal
   a. Do not handle container plants by the tops, stems or trunks at any time. Lift all plants so that the root ball is supported from the underside. Plants that do not have a satisfactory root system will be rejected. If plants do not have young feeder roots showing at the edge of the container, loosen their roots and score the root ball with a 1/2-inch-deep vertical line to encourage new feeder root development.
   b. Containers: Cut containers on 2 sides with a can cutter designed for the job. Do not injure root ball. Do not cut containers with spade or ax. After removing plant, superficially cut edge roots with knife on 3 sides.
   c. Boxes: Remove bottom of plant boxes before planting. Remove sides of box without damage to root ball after positioning plant and partially backfilling.
6. Planting
   a. Center plant in pit or trench. Root flare shall be approximately 1 inch above finish grade, such that the first lateral root is at or just beneath the surface.
   b. Face plants with fullest growth into prevailing wind.
   c. Set plant plumb and hold rigidly in position until soil has been tamped firmly around ball or roots.
   d. Backfill for trees and shrubs shall consist of amended native soil and granular fertilizer (applied at manufacturer's recommended rates by container size). If native soil is unavailable, unsuitable, or contaminated, use imported topsoil.
   e. For succulent plants, incorporate coarse washed sand as 33%-50% of the total backfill, mixed evenly.
   f. All plants which settle deeper than the surrounding grade shall be raised to the correct level, such that the root flare is above finished grade. After the plant has been placed, place backfill to cover approximately 1/2 of the height of the root ball. Fill the remainder of the hole with water to thoroughly saturate the root ball and adjacent soil.
   g. The remainder of the hole shall then be backfilled, and tamped firm.

h. After backfilling, an earthen basin shall be constructed around each plant. Each basin shall be of a depth sufficient to hold at least 2 inches of water. The basins shall be constructed of amended topsoil. Remove basin in all turf areas after initial watering.

7. Pruning shall be limited to the minimum necessary to remove injured twigs and branches, and to shape the plant material as directed by the Owner's Representative. Pruning shall not be done prior to delivery of plants.

8. Staking of all trees shall be completed immediately after planting. Remove nursery stakes once tree stakes are in place. All stakes shall be installed plumb and as indicated in the Drawings.

9. Damage to trees and shrubs during installation shall be cause for rejection.

D. Plug and Groundcover Planting:

1. Groundcover plants and plugs shall be grown in flats, liners, or containers as indicated on the Drawings. Flat and liner grown plants shall remain in those flats and liners until transplanting. The flat's soil shall contain sufficient moisture so that it will not fall apart when lifting the plants.

2. Planting shall be in straight rows and evenly spaced, unless otherwise noted, and at intervals called out in the Drawings. Triangular spacing shall be used unless otherwise noted on the Drawings.

3. Each rooted plant shall be planted with its proportionate amount of flat or container soil. Plantings shall be immediately sprinkled with water after planting until the entire area is soaked to the full depth of each hole.

4. Care shall be exercised at all times to protect the plants after planting. Any damage to plants by trampling or other operations shall be repaired immediately.

E. Mulch: All planting areas shall be dressed with a 3 inch layer of mulch. Where slopes are 3:1 or steeper, install jute mesh netting under mulch.

3.4 TREE ROOT BARRIER INSTALLATION

A. Install as shown on the Drawings. Surround application (encircling plants) is not allowed.

3.5 CLEAN UP

A. All materials and debris accumulated in conjunction with completing this Work, including trash, excess soil, and empty plant containers, shall be recycled or legally disposed of by Contractor off site.

B. All scars, ruts or other marks in the ground caused by this work shall be repaired and the ground left in a neat and orderly condition throughout the site.

C. The Contractor shall leave the site area broom-clean and shall wash down all walkways and other paved areas, leaving the premises in an excessively neat, clean, and safe condition.

D. Promptly remove soil, debris, or marks created by work from paved areas, buildings, site furnishings, and other appurtenances.

E. Clean vehicle tires before leaving site to avoid tracking soils onto paved areas.

END OF SECTION 32 90 00

SECTION 32 98 00 OPERATION AND MAINTENACE OF PLANTING

PART 1 GENERAL

1.1 SUMMARY

A. Maintain all plants in a vigorous growing condition throughout the maintenance period. Furnish all labor, materials, equipment, and services required. Provide selective pruning as required to promote desired structure, form, and long-term health. Apply supplemental materials, including fertilizers as needed. Apply herbicides and pesticides only as required to remedy significant problems that cannot be otherwise controlled through integrated pest management approaches. At all times, protect the health of users. Include trash, debris, and weed removal from the entire site, including sidewalks and gutters.

1.2 QUALITY ASSURANCE

A. Contractor shall be experienced in horticulture and landscape maintenance practice and shall provide sufficient workers and equipment under supervision of qualified foreman at all times.

B. All equipment shall be maintained in optimal condition, including freshly sharpened blades.

C. Sterilize all cutting tools prior to starting work at each site, and between cuts if disease is present or suspected.

1.3 MAINTENANCE PERIOD

A. Maintain the entire project throughout the course of work and during the 90 (ninety) calendar day maintenance period or until project acceptance.

B. Maintenance period shall not begin until all construction activity, including punchlist items, have been completed, including initial grow-in of turf areas. At a minimum, turf areas shall show a competitive, healthy, and even stand of grass, and shall have been mown at least twice.

C. Maintenance period will begin only upon written notice of completion by the Owner's Representative.

D. Any day of improper maintenance, as determined by the Owner's Representative, shall not count toward the completion of the maintenance period.

E. The Owner shall inspect the project, at a minimum, every month throughout the maintenance period. The contractor shall attend a final walkthrough of the project at least one week prior to the scheduled end of the maintenance period, and again at the scheduled end of the maintenance period, as scheduled by the Owner's Representative.

1.4 PROTECTION

A. Protect planting areas and plants against damage until final acceptance. Maintenance includes temporary barriers, fences, and signs as required.

1.5 GUARANTEE AND REPLACEMENT

A. Replace all missing, damaged, or otherwise non-performing materials, including plants, with new materials as specified in the contract documents at no additional cost to the Owner.

B. All repairs and installation of replacement materials shall occur within seven calendar days of notification.

C. The Owner's Representative shall be the sole judge as to the condition of materials.

1.6 FINAL ACCEPTANCE

A. Final acceptance shall occur only after the maintenance period has been completed and following observation by and approval of the Owner's Representative. The maintenance period shall end only upon written notice of final acceptance. Refer to section 01 77 00 – Contract Closeout.

PART 2 PRODUCTS

2.1 GENERAL

A. Provide a monthly record of all chemicals (if any) used on the site.

2.2 FERTILIZER

A. As specified in section 32 90 00 – Planting

2.3 MULCH

A. As specified in section 32 90 00 – Planting.

PART 3 EXECUTION

3.1 GENERAL

A. All frequencies of work listed in this section shall be considered minimum. Frequency shall be increased as required to ensure a neat and orderly appearance at all times.

B. Nursery stakes and tags shall be removed within the first 15 days of maintenance. Ensure all installed support stakes and ties are securely fastened but allow moderate movement.

3.2 WEEDING

A. All planted areas shall be weeded on a weekly basis. Weeds 3" and larger in any dimension shall be completely removed.

B. Herbicides and pesticides shall only be applied by appropriately licensed operators. Selective herbicide may be used in turf areas to control invasive or noxious weeds. Broad-spectrum herbicides shall only be used in spot applications. No herbicides shall be applied during windy conditions or in a manner that results in overspray or runoff.

3.3 FERTILIZATION

A. A general-purpose fertilizer (16-16-16 or similar formulation) shall be applied to all shrub and groundcover beds at a rate of 5 lbs. per 1,000 square feet, in intervals not less than 30 days and not more than 45 days, including applications at the beginning of the maintenance period and just prior to final acceptance.

B. Apply fertilizer evenly to the entire root zone.

3.4 PRUNING

A. Trees and shrubs shall in all cases be pruned according to ANSI 300 (Part 1)

B. Trees and shrubs shall be pruned to promote sound structure and planting intent, as follows.

1. In no case shall shrubs be balled, boxed, or cut into geometric forms.
2. Shrubs groups (more than one of the same species planted adjacent to each other) shall be allowed to grow together.
3. At maturity, plants shall fully and completely fill planting areas unless clearly shown otherwise on the drawings.

4. Except as noted below, shrubs shall not be sheared. Instead, branches shall be "headed back" prior to the ultimate desired length by removing the terminal bud and adjacent leaf groups if necessary for shape and to promote lateral branching.
   a. Straight rows of small-leaved evergreen shrubs shall be pruned as hedges, forming a solid and dense mass as either a border or background.
   b. Groundcover shall be edged by shearing as required to maintain walkway clearance and keep a neat appearance.
5. Dead or declining leaves of strap-leafed plants shall be removed in their entirety, but in all cases, the overall shape of the plant shall be maintained as a hemisphere rather than a vase, allowing leaves to arch toward the ground. Tip-prune leaves with sharp pruners only if needed for appearance.
6. Pollarding or heading back of trees shall not be allowed.

C. All crossing or rubbing branches shall be removed, in favor of the stronger or best placed branch.

D. Tree pruning to maintain required clearances shall be performed as required to maintain:
   1. Pedestrian passage: seven feet of overhead clearance
   2. Vehicular passage: fourteen feet of overhead clearance from the travel way.

E. Pruning to frame views or for other aesthetic purposes shall be done only as directed by the City's Representative.

3.5 MULCH

A. Mulch shall be reapplied to shrub and groundcover areas throughout the maintenance period as required to maintain the original depths specified.

B. Mulch shall be topped off just prior to final acceptance.

3.6 DEBRIS

A. All clippings, pruning, and other herbaceous or woody material shall be collected and transported to a green waste recycling center at no additional cost to the Owner.

B. All trash shall be bagged, removed, and legally disposed of off-site.

3.7 IRRIGATION

A. Contractor shall operate, visually inspect, and adjust the system <u>weekly</u> for proper operation and to minimize or eliminate overspray and runoff.

B. Adjust programming as required for optimal plant health, providing deep irrigation without water loss below the root zone, and avoiding overwatering and runoff.

C. Hand watering, if required, shall use a hose-end diffuser, and minimize soil disturbance.

D. Repairs, if necessary, shall be accomplished within twenty-four hours, and at no additional expense to the Owner.

END OF SECTION 32 98 00

SECTION 33 00 00 SITE SEWER AND WATER UTILITIES

PART 1 - GENERAL

1.1 INCLUSION OF OTHER CONTRACT DOCUMENTS

A. The General Conditions, Supplementary Conditions and Division 1 are fully applicable to this Section, as if repeated herein.

1.2 SCOPE OF WORK

A. The work includes, but is not necessarily limited to, the following:

1. Domestic water piping system.
2. Fire protection piping systems.
3. Sewer piping system.

B. Other items that may be specified or shown on the Drawings.

1.3 RELATED WORK SPECIFIED ELSEWHERE

A. Section 01 5000, Temporary Facilities and Controls.

B. Pertinent Sections specifying Volatile Organic Compound (VOC) Content Restrictions.

C. Section 31 0000, Earthwork.

D. Section 31 2333, Trenching and Backfilling.

E. Section 31 3100, Soil Treatment

F. Section 32 1600, Site Concrete.

1.4 SUBMITTALS

A. Use only new materials and products, unless existing materials or products are specifically shown otherwise on the drawings to be salvaged and re-used.

1. Sun damaged or discolored PVC pipe will be rejected.

B. All materials, components, assemblies, workmanship and installation are to be observed by the Owner's Inspector of Record. Work not so inspected is subject to uncovering and replacement.

C. The representatives of the Owner’s testing lab will not act as supervisor of construction, nor will they direct construction operations. Neither the presence of the Owner’s testing lab representatives nor the testing by the Owner’s testing lab shall excuse the contractors or subcontractors for defects or deficiencies discovered in their work during or following completion of the project. Correcting inadequate compaction is the sole responsibility of the contractor.

D. Contractor shall be solely responsible for all subgrades built. Any repairs resulting

from inadequate compaction or incorrect grades will be the responsibility of the contractor.

E. Per 2016 NFPA 13 provide Contractor's material and test certificate to the Owner, Architect, Project Inspector and Local Fire Authority.

1.5 SUBMITTALS

A. Refer to Section 01 3300.

B. Manufacturer's Data: Submit list and complete descriptive data of all products proposed for use. Include manufacturer's specifications, published warranty or guarantee, installation instructions, and maintenance instructions.

C. Provide sieve analysis from accredited testing lab on pipe bedding material, if needed. Analysis shall have a current date not older than project contract signing date.

D. Substitution: Provide all data of proposed material being submitted as a substitution. Provide comparison with specified product data and identify all differences. Failure to provide comparison will be reason for rejection.

1.6 FEES, PERMIT, AND UTILITY SERVICES

A. Obtain and pay for permits and service charges required for installation of Work. Arrange for required inspections and secure written approvals from authorities having jurisdiction.

B. Upon completion of work within right-of-way, provide copies of written final approval to the Architect.

1.7 GUARANTEE

A. Refer to General Conditions and Section 01 3300.testing

1.8 REFERENCE AND STANDARDS

A. ANSI/ASTM D698-00 - Test Methods for Moisture-Density Relations of Soils and Soil-Aggregate Mixtures, Using 5.5 lb (2.49 Kg) Rammer and 12-inch (304.8 mm) Drop.

B. ANSI/ASTM D1556-00 - Test Method for Density of Soil in Place by the Sand-Cone Method.

C. ANSI/ASTM D1557-02 - Test Methods for Moisture-Density Relations of Soils and Soil-Aggregate Mixtures Using 10 lb. (4.54 Kg) Rammer and 18-inch (457 mm) Drop.

D. ANSI/ASTM D 3017-05 Test Methods for Moisture Content of Soils and Soil-Aggregate Mixture by Nuclear Methods (Shallow Depth).

E. ANSI/ASTM D 422-63 Test Method for Particle Size Analysis of Soil.

F. ANSI/ASTM D 4318-05 Test Method for Liquid Limit, Plastic Limit, and Plasticity Limit.

G. CALTRANS Standard Specifications.

H. CAL-OSHA, Title 8, Section 1590 (e).

I. Any work within the street, highway or right-of-way shall be performed in accordance with the requirement of the governmental agencies having jurisdiction, and shall not begin until all of those governing authorities have been notified.

J. NFPA 13, 24 and 25, latest editions.

K. California State Health and Safety Code Section 116875, Lead Free Public Water Systems.

L. California Plumbing Code, latest edition.

1.9 DELIVERY, STORAGE AND HANDLING

A. Transport, store and handle in strict accord with the local jurisdiction.

B. Make delivery to job when notified by Contractor verifying that the job is ready to receive the work of this Section and that arrangements have been made to properly store, handle and protect such materials and work.

1.10 PROJECT CONDTIONS

A. Existing civil, mechanical and electrical improvements are shown on respective site plans to the extent known. Should the Contractor encounter any deviation between actual conditions and those shown, he is to immediately notify the Architect before continuing work.

1.11 EXISTING SITE CONDITIONS

A. Contractor shall acquaint himself with all site conditions. If unknown active utilities are encountered during work, notify Architect promptly for instructions. Failure to notify will make Contractor liable for damage to these utilities arising from Contractor's operations subsequent to discovery of such unknown active utilities.

1.12 PROTECTION

A. Adequate protection measures shall be provided to protect workmen and passers-by on and off the site. Adjacent property shall be fully protected throughout the operations. Blasting will not be permitted. Prevent damage to adjoining improvements and properties both above and below grade. Restore such improvements to original condition should damage occur. Replace trees and shrubs outside building area disturbed by operations.

B. In accordance with generally accepted construction practices, the Contractor shall be solely and completely responsible for working conditions at the job site, including safety of all persons and property during performance of the work. This requirement shall apply continuously and shall not be limited to normal working hours.

C. Any construction review of the Contractor's performance conducted by the Geotechnical Engineer is not intended to include review of the adequacy of the Contractor's safety measures, in, on, or near the construction site.

D. Provide shoring, sheeting, sheet piles and or bracing to prevent caving, erosion or gullying of sides of excavation.

E. Surface Drainage: Provide for surface drainage during period of construction in manner to avoid creating nuisance to adjacent areas. The contractor shall make a reasonable effort on a daily basis to provide pumps and all equipment necessary to keep all excavations and the site free from water during entire progress of work, regardless of cause, source, or nature of water.

F. Adjacent streets and sidewalks shall be kept free of mud, dirt or similar nuisances resulting from earthwork operations.

G. The site and adjacent influenced areas shall be watered as required to suppress dust nuisance. Dust control measures shall be in accordance with the local jurisdiction.

H. Trees: Carefully protect existing trees that are to remain. Provide temporary irrigation as necessary to maintain health of trees.

1.13 SEASONAL LIMITS

A. No fill material shall be placed, spread or rolled during unfavorable weather conditions. When work is interrupted by rains, fill operations shall not be resumed until field tests indicate that moisture content and density of fill are satisfactory.

1.14 RECORD DRAWINGS

A. Keep a daily record of all pipe placed in ground, verified by Project Inspector.

B. Upon completion of this Contract, furnish one tracing showing all outside utility lines, piping, etc., installed under this Contract. Locate and dimension all work with reference to permanent landmarks.

C. All symbols and designations used in preparing "RECORD" drawings shall match those used in Contract drawings.

D. Properly identify on as-builts and provide dimensions for all stubs for future connections. Provide concrete markers 6” dia. 12” deep, flush with finish grade at the ends of all stubbed pipes.

E. Provide record drawings per Section 01 3300.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. VOC Limits for adhesives, sealants, fillers, coatings and primers. Comply with limits specified in related Section.

B. Provide products conforming to local, State and Federal government requirements limiting the amount of volatile organic compounds contained in the product, for its intended application. If specified product exceeds current requirement, provide conforming product at no additional cost. Provide written confirmation to Architect describing reason for revision and demonstrate compliance of replacement product

with specified requirements.

2.2 MATERIALS - GENERAL

A. Provide each item listed herein or shown on drawings of quality noted or approved equal. All material shall be new, full weight, standard in all respects and in first-class condition. Insofar as possible, all materials used shall be of same brand or manufacture throughout for each class of material or equipment. Materials shall be of domestic manufacture and shall be tested within Continental United States.

B. Grade or quality of materials desired is indicated by trade names or catalog numbers stated herein.

C. Dimensions, sizes, and capacities shown are minimum and shall not be changed without permission of Architect.

D. All materials in this section used for any public water system or domestic water for human consumption shall be lead free.

1. For the purposes of this section, “lead free” means not more than 0.2 percent lead when used with respect to solder and flux and not more than 8 percent when used with respect to pipes and pipe fittings.

2. All pipe, pipe or plumbing fitting or fixtures, solder, or flux shall be certified by an independent American National Standards Institute (ANSI) accredited third party, including, but not limited to, NSF International, as being in compliance with this section.

E. All materials used for fire system piping shall be UL and FM approved.

2.3 VALVE BOXES

A. Provide at each valve or cock in ground a Christy, Brooks, or equal to Christy G08CT, concrete valve box with cover marked for service, domestic water shall be marked “Water”, recycled water marked “Non-Potable” with a triangular lid, and fire supply shall be marked “Fire”. Furnish extension handles for each size square nut valve, and provide “fork” handle for each size of “wheel handle” valve as required. Do not locate valve boxes in walk, or covered passages, curbs, or curb & gutters, unless necessary. If valve location is within concrete or asphalt paved surface valve box shall be detailed on plans for such condition. Provide valve box extensions as required to set bottom of valve box to bottom of piping in which valve is installed. Provide Owner with set of special wrenches and/or tools as required for operation of valves.

2.4 PIPES AND FITING

A. Sanitary Sewer: PVC sewer pipe and fittings with Ring-Tite joints, ASTM D3034 SDR35.

B. Domestic water and non-potable lines 3 1/2” and smaller: Schedule 80 PVC, ASTM D 1784, ASTM D 1785. Non-potable lines shall be colored purple.

C. Water lines and non-potable lines 4” and larger: AWWA C-900 Class 150/DR18 with rubber gasket joints. Non-potable lines shall be colored purple.

D. Fire lines 4” and larger: AWWA C-900 Class 200/DR14 with rubber gasket joints.

E. Solder: Lead Free. 95/5; 95% Tin / 5% Antimony.

F. Ductile Iron Pipe; AWWA Class 51, Cement Lined

G. Ductile Iron Pipe Fittings; AWWA C110, C153, Ebba Iron, Star Romac, Sigma, or approved equal.

H. PVC Mechanical Fittings; Ebba Iron, Star; Romac; Sigma or approved equal.

I. Ductile Iron Pipe/PVC C-900 Pipe Restrained Fittings; Ebba Iron # 3800 Mega Coupling, Ebba Iron 1100CH Split Restrained Harness for pipe couplings. StarGrip Series 4000.

J. Ductile Iron Pipe/PVC C900, C905 Restrained Degreedand Blind Cap Fittings,; Mega Lug; Sigma; Romac; or an approved equal

K. Mechanical Fitting Bolts; Bolts and nuts shall be carbon steel with a minimum 60,000 psi tensile strength conforming to ASTM A 307, Grade A. Bolts shall be standard ANSI B1.1 Class 2A course threads. Nuts shall conform to ASTM A 563 and be standard ANSI B1.1, Class 2A course thread. All bolts and nuts shall be zinc coated.

L. Fasteners Anti-Rust Coatings; After assembly, coat all fasteners with an Asphaltic Bituminous coatings conforming to latest edition NFPA 24.

M. Ductile Iron Pipe Wrap; 8 mil polyethylene pipe wrap conforming to ANSI/AWWA C105/A21.5 standards.

N. Pipe Insulation; Pipe exposed to atmospheric conditions ½” thru 4” NPT; Johns Manville rigid fiberglass insulation, Micro Lok HP; Owens Corning Fiberglas SSL II; Conforming to ASTM C 612, Type 1A or type 1B.

O. Aluminum field applied pipe insulation jacket; comply with ASTM B209, ASTM C1729, ASTM C1371 Manufacturers; Childers Metals; ITW Insulation Systems Aluminum Jacketing; or an approved equal.

1. Finish shall be flat mill finish

2. Factory Fabricated Fitting Covers; 45 and 90 degree elbows, tee’s, valve covers, end caps, unions, shall be of the same thickness and finish of jacket.

3. The fittings shall be composed of 2-pieces

4. Adhesives; per the manufacturers requirements

5. Joint Sealant; shall be silicone, and shall be aluminum in color.

2.5 SANITARY SEWER MANHOLES

A. Shall be constructed as shown on plan details.

2.6 CLEANOUTS

A. Materials testing of concrete and continuous batch plant inspection may be waived in accordance CBC Sections 1705A. Cleanouts of same diameter as pipe up to 8” in size shall be installed in all horizontal soil and waste lines where indicated and at all points of change in direction. Cleanouts shall be located not less than 24” from building so as to provide sufficient space for rodding. No horizontal run over 100 feet shall be without cleanout whether shown on drawings or not.

B. All cleanout boxes shall be traffic rated with lid labeled “SEWER”, Christy G05CT or approved equal. Lid shall be vandal proof with stainless steel screws

C. Back of sidewalk cleanouts shall be constructed in accordance with the Standard Details.

2.7 UNIONS

A. Furnish and install one union at each threaded or soldered connection to equipment and 2 unions, one on each side of valves on pipes ½” to 3”.

B. Locate unions so that piping can be easily disconnected for removal of equipment or valve. Provide type specified in following schedule:

Type of Pipe Union

Steel Pipe:	150 lb. Screwed malleable ground joint, brass, brass-to-iron seat, black or galvanized to match pipe.
Copper tubing:	Brass ground joint with sweat connections.
PVC Sch 80 pipe:	PVC union, FIPT X FIPT

2.8 VALVES

A. Provide valves as shown and other valves necessary to segregate branches or units. Furnish valves suitable for service intended. Valves shall be properly packed and lubricated. Valves shall be non-rising stem. Place unions adjacent to each threaded or sweat fitting valve. Install valves with bonnets vertical. All valves shall be lead free.

B. Valves ½” thru 2”; shall be made of bronze, full size of pipe and lead free. Nibco S-113-FL Series; American G-300 Series; Matco 511 FL Series; Apollo 102T-FL Series. Brass valves of brass parts within valves will not be accepted.

C. Valves, 2 ½” thru 3” shall be class 150; Shall be made of bronze, full size of pipe; Jenkins Fig. 2310 J; Lunkinheimer Fig. 2153; Crane Fig. 437; Stockham Fig. B-128. RW; American 2500 Series; Kennedy 8561; Mueller 2360 Series.

2.9 FIRE HYDRANTS

A. Long Beach Iron Works Model 960 with Long Beach Iron Works Model LB400 break off check valve. Factory Painted or per Local Jurisdiction Requirements, or an approved equal, 36" minimum bury, two 2-1/2" hose nozzles, one 4-1/2" pumper nozzle, intermediate section to serve as break-off flange with check valve. Hydrant shall conform to, and installation shall comply with the Local Jurisdiction.

2.10 POST INDICATOR

A. Post Indicator shall be Mueller Co. A-20806 (adjustable) with tamper switch or approved equal. Comply with Local Jurisdiction requirements.

2.11 DOUBLE CHECK VALVE, DOUBLE CHECK DETECTOR AND REDUCED PRESSURE BACKFLOW PREVENTERS

A. Backflow preventers shall be as approved by the local agency and by the State of California's Department of Health Services most recent list of approved reduced pressure backflow preventers. All approved backflow preventers shall have ductile iron bodies. Comply with Local Jurisdiction requirements.

1. Provide Backflow preventer blankets with locking device. Weatherguard R-30 insulated or equal.

2. Provide ball valve at all test ports with brass plug in valve.

3. Provide a minimum of 2 valve tamper switches on fire prevention Backflows.

2.12 TAPPING SLEEVE

A. Shall be used on pipe sizes 6" thru 12" and shall be made with stainless steel material including stainless steel bolts and approved by the County. Flanges shall be ductile iron or high carbon steel. Gaskets shall seal full circumference of pipe. Shall be manufactured for operating pressure of 200 psi, and shall pass test pressure of 300 psi. Romac SST series; Smithblair 662; Mueller H304; Ford "FAST" tapping sleeve.

2.14 TRACER WIRE

A. No. 10 THW solid copper wire. Use waterproof splicing kits at all splices. Wire shall extend into all valve boxes as shown on the drawings and to all above ground appurtenances.

PART 3 - EXECUTION

3.1 DRAWINGS AND COORDINATION

A. General arrangement and location of piping, etc., are shown on Drawings or herein specified. Install work in accord therewith, except for minor changes that may be necessary on account of other work or existing conditions. Before excavation, carefully examine other work that may conflict with this work. Install this work in harmony with other craft and at proper time to avoid delay of work.

B. Verify invert elevations at points of connection to existing systems prior to any excavation. If invert elevations differ from that shown on drawings, notify Architect immediately.

C. In advance of construction, work out minor changes if conflicts occur with electrical or mechanical. Relocate services to suit actual conditions and work of other trades to avoid conflict therewith. Any adjustments or additional fittings to make adjustments shall not be cause for additional costs to the owner.

D. Execute any work or apparatus shown on drawings and not mentioned in specifications, or vice versa. Omission from Drawings or Specifications of any minor details of

construction, installation, materials, or essential specialties does not relieve Contractor of furnishing same in place complete.

E. Gravity pipes shall take precedence. If conflict should occur while placing the domestic water, non-potable water, and fire service piping, the contractor shall provide any and all fittings necessary to route the water lines over such conflicting pipes at no additional costs to the owner.

3.2 ACCESS

A. Continuously check for clearance and accessibility of equipment or materials specified herein to be placed. No allowance of any kind shall be made for negligence on part of Contractor to foresee means of installing his equipment or materials into proper position.

3.3 EXCAVATING AND BACKFILLING

A. Excavation and Bedding:

1. General: Trench straight and true to line and grade with bottom smooth and free of irregularities or rock points. Trench width to be a minimum of 12" wider than outside diameter of pipe. Follow manufacturer's recommendations for use of each kind and type of pipe.

2. Bedding: Provide a bedding as noted on drawing details for the full length of the pipe. Bedding shall have a minimum thickness beneath the pipe of 4" or 1/8 the outside diameter of the pipe, which ever is greater. Provide bell holes and depressions for pipe joints only of size required to properly make joint. Pipe canbe laid on native material as long as the bottom of the trench is stable and free of rocks/clods greater than 1”.

3. If the trenches for the site utilities falls within areas to be lime treated, the piping shall be installed prior to any lime treatment operations, providing the elevation of the piping is below the treatment section.

    a. If trenching is necessary in areas that have been previously lime treated the contractor shall backfill the trench with class 2 aggregate base, with minimum section equal to the lime treated section and compacted to 95%.

B. Laying of Pipe:

1. General: Inspect pipe prior to placing. Sun damaged pipe will be rejected. Set aside any defective or damaged material. Do not place pipe in water nor place pipe when trenches or weather are unsuitable. Lay pipe bell upgrade, true to line and grade.

    a. Sewer pipe shall be laid in strict conformity to the prescribed line and grade, with grade bars set and each pipe length checked to the grade line. Three consecutive points on the same rate of slope shall be used at all times to detect any variation from a straight grade. In any case of discrepancy, work shall be stopped and the discrepancy immediately reported to the Owner’s Representatives. In addition, when requested by the Owner's Representative, a string line shall be used in the bottom of the trench to insure a straight alignment of the sewer pipe between manholes. The maximum deviation from grade shall not be in excess of 1/4 inch. In returning the pipe to grade, no more than ¼” depression shall result.

b. The Contractor shall expose the end of existing pipe to be extended, for verification of alignment and elevation, prior to trenching for any pipe which may be affected. All costs of such excavation and backfill shall be included in the price paid for the various items of work. A temporary plug, mechanical type shall be installed on sewer pipe at the point of connection to existing facilities. If connecting to a public facility the plug shall conform to the requirements of the local jurisdiction. This plug shall remain in place until the completion of the balling and flushing operation.

2. Bell and Spigot Joints: Lubricate inside of bells and outside of spigots with soap solution. Wedge joints tight. Bell of bell and spigot pipe to be pointed upgrade.

C. Backfilling:

1. General: Do not start backfill operations until required testing has been accomplished, unless approved by Engineer. If backfilling occurs prior to testing, contractor shall be responsible for all work to locate any deficiencies discovered during the testing procedures.

2. Compaction and Grading: Remainder of backfill shall be in accordance with Section 31 2333 – TRENCHING AND BACKFILLING.

3. If trenching in area previously lime or cement treated backfill top of trench section, same depth as lime or cement treatment with Class 2 Aggregate Base compacted to 95% minimum relative compaction.

3.4 INSTALLATION OF WATER PIPING

A. Immediately cap or plug ends of, and opening in, pipe and fittings to exclude dirt until final connections made. Use reducing fittings where any change in pipe size occurs. Bushings shall not be used.

B. General: Should existing conditions or other work prevent the running of pipes or the setting of equipment at the points indicated by drawings, changes as authorized by the Architect shall be made without additional cost to the Owner.

C. All bolts used on mechanical fittings shall be thoroughly coated with an asphaltic bituminous coating conforming to 2007 NFPA 10.3.5.2 and 10.8.3.5.

D. All buried metal shall be incased with 8 mil polyethylene wrap so that no soil is in contact with metal. Ends of polyethylene wrap shall be taped to provide seal with pipe.

E. Do not install water lines in the same trench with sewer lines.

F. Under no circumstance shall a fitting be located directly under a structural footing without prior approval from the Architect.

G. In locations where existing domestic pipe is rerouted, the new pipe shall be assembled using restrained fittings at all joints including factory pipe joints. Tapped restrained blind flanges shall be temporarily installed at each end of the assembled pipes until testing and chlorination is completed and approved.

3.5 CLOSING IN OF UNINSPECTED WORK

A. Do not allow or cause work installed to be covered up or enclosed before it has been inspected, tested, and approved. Should work be enclosed or covered up before it has been approved, uncover work at own expense, unless previously approved by the Engineer. After it has been inspected, tested and approved, make repairs necessary to restore work of other contractors to condition in which it was found at time of cutting.

3.6 CARE AND CLEANING

A. Repair or replace broken, damaged, or otherwise defective parts, materials, and work. Leave entire work in new condition satisfactory to Architect. At completion, carefully clean and adjust equipment, fixtures and trim that are installed as part of this work. Leave systems and equipment in satisfactory new operating condition.

B. Drain and flush piping to remove grease and foreign matter.

C. Sewer piping shall be balled and flushed.

D. Storm drain piping shall be cleaned of all sand and debris.

E. Clean out and remove surplus materials and debris resulting from the work, including surplus excavated material.

F. Flush fire service piping 3 times in the presence of the project inspector or as directed. Each flushing shall be 3 minutes minimum.

3.7 SEWER INTERNAL INSPECTION

A. Upon completion of construction and prior to final inspection, the Contractor shall clean the entire new pipeline of all dirt and debris. Any dirt or debris in previously existing pipes or ditches in the area, which resulted from the new installation, shall also be removed. Pipes shall be cleaned by the controlled balling and flushing method. Temporary plugs shall be installed and maintained during cleaning operations at points of connection to existing facilities to prevent water, dirt, and debris from entering the existing facility.

B. Provide video inspection for all site sewer piping. An electronic copy of the video inspection shall be provided to the project inspector for review and approval prior to acceptance of the piping.

3.8 TEST OF PIPING

A. Pressure Test piping at completion of roughing-in, in accord with following schedule, and show no loss in pressure or visible leaks after minimum duration or four (4) hours at test pressures indicated.

B. Chlorination tests shall be performed after all fixtures and any required mechanical devices are installed and the entire system is complete and closed up.

C. In cases where new domestic water piping is assembled for re-routing of existing domestic water pipe, the contractor shall perform the following testing prior to

connecting the new water pipe to the existing system.

1. The pipe shall be pressure tested and per the test schedule.

2. The pipe shall be pressure tested down within the trench.

3. The contractor shall dig a temporary ditch below the existing pipe to drain to a sump that is lower than the bottom of the trench and to the side of the trench. The sump shall be 30% larger than the total volume of water within the testing pipe assembly.

4. After pressure testing and chlorination has taken place and accepted, the contractor shall drain the pipe into the sump and pump the sump out as it is filling.

5. The temporary test fittings at each end of the pipe assembly shall be removed and the final restrained couplings installed.

6. The existing piping shall be cut and the water within the pipe shall drain below the pipe to the temporary sump. Pump the sump as it is being filled up. Take extreme caution not to contaminate the existing pipe with any contaminates within the trench.

7. Before making the final coupling connections, the restrained couplings at each end of the new pipe shall be thoroughly swabbed inside the fitting with a solution of chlorine mixed with water at a rate of 1part chlorine to 4 parts potable water.
8. After final connections are made, a visual inspection shall be made after fittings are wiped off. If after 1 hr, no noticeable drips are noted the pipe can be backfilled.

9. The contractor shall flush all water piping affected by chlorination until it is within acceptable levels approved by certified testing lab.

TEST SCHEDULE

System Tested	Test Pressure PSIG Test With
Public Water Mains	Per local jurisdiction requirements.
Private Domestic Water Piping:	150 psi for 2 hrs. Allowable leakage per AWWA Standards
Fire Protection Piping:	200 psi for 2 hrs. Allowable leakage per AWWA and Local Jurisdiction Standards
Sanitary Sewer Piping:	Sewer system shall be air tested at 4 psi for 3 minutes. Allowable leakage shall be per pipe manufacturer's recommendation.

D. Testing equipment, materials, and labor shall be furnished by contractor.

3.9 WATER SYSTEM STERILIZATION

A. Public Water Mains and non-potable water mains: Shall be flushed and disinfected per the local jurisdiction requirements

B. Clean and disinfect all site water systems connected to the domestic water systems in accordance with AWWA Standard C651 and as required by the local Building and Health Department Codes, and EPA.

1. Clean and disinfect industrial water system in addition to the domestic water system.

2. Disinfect existing piping systems as required to provide continuous disinfection upstream to existing valves. At Contractors option, valves may be provided to isolate the existing piping system from the new piping system.

C. Domestic water sterilization shall be performed by a licensed “qualified applicator” as required by CAL-EPA Pesticide Enforcement Branch for disinfecting and sterilizing drinking water.

D. Disinfecting Agent: Chlorine product that is a registered product with Cal-EPA for use in California potable water lines, such as Bacticide, CAL-EPA Registration No. 37982-20001.

E. Contractor to provide a 1” service valve connected to the system at a point within 2’-0” of its junction with the water supply line. After sterilization is complete Contractor to provide cap at valve.

F. Sterilization Procedure to be as follows:

1. Flush pipe system by opening all outlets and letting water flow through the system until clear water flows from all outlets.

2. Inject disinfecting agent to provide a minimum chlorine residual concentration of at least 50 parts per million (ppm) of free chlorine at each outlet.

3. Provide sign at all outlets which reads “Water Sterilization in Progress – Do not operate”. Remove signs at conclusion of test.

4. Close all outlets and valves, including valve connecting to water supply line and 1” service valve. Retain treated water in pipe for a minimum of twenty-four hours. Should chlorine residual at pipe extremities be less than 50 PPM at this time, pipe shall be re-chlorinated. As an option, the water systems may be filled with a water-chlorine solution containing a minimum of 200 PPM of chlorine and allowed to stand for three hours.

5. After chlorination, flush lines of chlorinated water and dispose as allowed by the local jurisdiction into local jurisdiction system. If no system is available, contractor may de-chlorinate line and dispose on site after approval from the Engineer or District. Refill from domestic supply. Continue flushing until residual chlorine is less than or equal to 0.2 ppm, or a residual the same as that of the test water.

G. Chemical and bacteriological tests shall be conducted by a state-certified laboratory and approved by the County.

H. Submit written report to Health Department as required by State Regulations. Provide a copy of report to Architect prior to completion of project.

I. The costs of sterilization and laboratory testing shall be paid for by the contractor.

3.10 CLEANING

A. Upon completion of work of this Section promptly remove from the working area all scraps, debris and surplus material of this Section.

END OF SECTION 33 00 00

SECTION 33 40 00 STORM DRAINAGE UTILITIES

PART 1 - GENERAL

1.1 INCLUSION OF OTHER CONTRACT DOCUMENTS

A. The General Conditions, Supplementary Conditions and Division 1 are fully applicable to this Section, as if repeated herein.

1.2 RELATED WORK SPECIFIED ELSEWHERE

A. Section 01 5000, Temporary Facilities and Controls.

B. Pertinent Sections specifying Volatile Organic Compound (VOC) Content Restrictions.

C. Section 31 0000, Earthwork.

D. Section 31 2333, Trenching and Backfilling.

E. Section 31 3100, Soil Treatment

F. Section 32 1600, Site Concrete.

1.3 SUBMITTALS

A. Use only new materials and products, unless existing materials or products are specifically shown otherwise on the Drawings to be salvaged and re-used.

B. All materials, components, assemblies, workmanship and installation are to be observed by the Owner's Inspector of Record. Work not so inspected is subject to uncovering and replacement.

C. The representatives of the Owner’s testing lab will not act as supervisor of construction, nor will they direct construction operations. Neither the presence of the Owner’s testing lab representatives nor the testing by the Owner’s testing lab shall excuse the contractors or subcontractors for defects discovered in their work during or following completion of the project. Correcting inadequate compaction is the sole responsibility of the contractor.

D. Contractor shall be solely responsible for all subgrades built. Any repairs resulting from inadequate compaction are the responsibility of the contractor.

1.4 SUBMITTALS

A. Refer to Section 01 3300.

B. Manufacturer's Data: Submit list and complete descriptive data of all products proposed for use. Include manufacturer's specifications, published warranty or guarantee, installation instructions, and maintenance instructions.

1.5 GUARANTEE

A. Refer to General Conditions and Section 01 3300.

1.6 REFERENCE AND STANDARDS

A. ANSI/ASTM D698-00 - Test Methods for Moisture-Density Relations of Soils and Soil-Aggregate Mixtures, Using 5.5 lb (2.49 Kg) Rammer and 12-inch (304.8 mm) Drop.

B. ANSI/ASTM D1556-00 - Test Method for Density of Soil in Place by the Sand-Cone Method.

C. ANSI/ASTM D1557-02 - Test Methods for Moisture-Density Relations of Soils and Soil-Aggregate Mixtures Using 10 lb. (4.54 Kg) Rammer and 18-inch (457 mm) Drop.

D. ANSI/ASTM D 3017-05 Test Methods for Moisture Content of Soils and Soil-Aggregate Mixture by Nuclear Methods (Shallow Depth).

E. ANSI/ASTM D 422-63 Test Method for Particle Size Analysis of Soil.

F. ANSI/ASTM D 4318-05 Test Method for Liquid Limit, Plastic Limit, and Plasticity Limit.

G. CALTRANS Standard Specifications.

H. CAL-OSHA, Title 8, Section 1590 (e).

I. Any work within the street, highway or right-of-way shall be performed in accordance with the requirement of the governmental agencies having jurisdiction, and shall not begin until all of those governing authorities have been notified.

J. California Plumbing Code current edition.

1.7 DELIVERY, STORAGE AND HANDLING

A. Transport, store and handle in strict accord with the local jurisdiction.

B. Make delivery to job when notified by Contractor verifying that the job is ready to receive the work of this Section and that arrangements have been made to properly store, handle and protect such materials and work.

1.8 PROJECT CONDTIONS

A. Existing civil, mechanical and electrical improvements are shown on respective site plans to the extent known. Should the Contractor encounter any deviation between actual conditions and those shown, he is to immediately notify the Architect before continuing work.

1.9 EXISTING SITE CONDITIONS

A. Contractor shall acquaint himself with all site conditions. If unknown active utilities are encountered during work, notify Architect promptly for instructions. Failure to notify will make Contractor liable for damage to these utilities arising from Contractor's operations subsequent to discovery of such unknown active utilities.

1.10 PROTECTION

A. Adequate protection measures shall be provided to protect workmen and passers-by on and off the site. Adjacent property shall be fully protected throughout the operations. Blasting will not be permitted. Prevent damage to adjoining improvements and properties both above and below grade. Restore such improvements to original condition should damage occur. Replace trees and shrubs outside building area disturbed by operations.

B. In accordance with generally accepted construction practices, the Contractor shall be solely and completely responsible for working conditions at the job site, including safety of all persons and property during performance of the work. This requirement shall apply continuously and shall not be limited to normal working hours.

C. Any construction review of the Contractor's performance conducted by the Geotechnical Engineer is not intended to include review of the adequacy of the Contractor's safety measures, in, on, or near the construction site.

D. Provide shoring, sheeting, sheet piles and or bracing to prevent caving, erosion or gullying of sides of excavation.

E. Surface Drainage: Provide for surface drainage during period of construction in manner to avoid creating nuisance to adjacent areas. The contractor shall make a reasonable effort on a daily basis to provide pumps and all equipment necessary to keep all excavations and the site free from water during entire progress of work, regardless of cause, source, or nature of water.

F. Adjacent streets and sidewalks shall be kept free of mud, dirt or similar nuisances resulting from earthwork operations.

G. The site and adjacent influenced areas shall be watered as required to suppress dust nuisance. Dust control measures shall be in accordance with the local jurisdiction.

H. Trees: Carefully protect existing trees that are to remain.

1.11 SEASONAL LIMITS

A. No fill material shall be placed, spread or rolled during unfavorable weather conditions. When work is interrupted by rains, fill operations shall not be resumed until field tests indicate that moisture content and density of fill are satisfactory.

1.12 TESTING

A. Geotechnical Engineer: Owner is retaining a Geotechnical Engineer to determine compliance of fill with Specifications, and to direct adjustments in fill operations. Costs of Geotechnical Engineer will be borne by Owner; except those costs incurred for re-tests or re-inspection will be paid by Owner and backcharged to Contractor.

1.13 RECORD DRAWINGS

A. Keep a daily record of all pipe placed in ground, verified by Project Inspector.

B. Upon completion of this Contract, furnish one tracing showing all outside utility lines, piping, etc., installed under this Contract. Locate and dimension all work with

reference to permanent landmarks.

C. All symbols and designations used in preparing "RECORD" drawings shall match those used in Contract drawings.

D. Properly identify all stubs for future connections, as to location and use, by setting of concrete marker at finished grade or other marker agreeable to the Architect in the manner suitable to Architect or County staff.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. Provide products conforming to local, State and Federal government requirements limiting the amount of volatile organic compounds contained in the product, for its intended application. If specified product exceeds current requirement, provide conforming product at no additional cost. Provide written confirmation to Architect describing reason for revision and demonstrate compliance of replacement product with specified requirements

2.2 MATERIALS - GENERAL

A. Pipe: Use one of the following, unless noted on the Drawings otherwise.

1. Polyvinyl Chloride Pipe (PVC): SDR35 conforming to ASTM D3034 with elastomeric joints conforming to ASTM D3212 for pipe to 12". Sun damaged pipe will be rejected.

2. Rubber Gasketed Reinforced Concrete Pipe (RGRCP) conforming to ASTM C76.

B. Perforated Pipe (for horizontal percolation drains): Shall be:

1. ADS N12 pipe or equal, 3 hole, ASTM F 405, AASHTO M 252

2. PVC ASTM D3034 SDR-35 storm drain pipe

C. Manhole: Shall be as shown on the drawing details.

D. Drop Inlet: Shall be as shown on the drawing details.

E. Curb Inlet: Shall be as shown on the drawing details.

F. Mortar: For pipe connections to concrete drainage structures, conform to ASTM C270 type N mortar. Place within one half hour after adding water.

G. Crushed Rock: Imported washed crushed rock. Minimum 100% passing 3/4 inch sieve.

H. Trench drain: Polycast, Polydrain or equal and as shown on drawings.

I. Area Drains: Shall be as shown on the drawing details.

J. Floor Drains: Shall be as shown on the drawing details.

K. Clean-outs: Shall be as shown on the drawing details.

L. Planter drains: Shall be as detailed on the drawing details.

M. Filter Fabric: Mirafi 140N.

N. 1 ½" Clean drain rock: Shall be the type used for sewer leach field construction.

PART 3 - EXECUTION

3.1 INSPECTION LAYOUT AND PREPARATION

A. Prior to installation of the work of this Section, carefully inspect and verify by field measurements that installed work of all other trades is complete to the point were this installation may properly commence

B. Layout all work, establish grades, locate existing underground utilities, set markers and stakes, setup and maintain barricades and protection facilities; all prior to beginning actual earthwork operations. Layout and staking shall be done by a licensed Land Surveyor or Professional Civil Engineer.

C. Verify that specified items may be installed in accordance with the approved design.

D. In event of discrepancy, immediately notify Owner and the Architect. Do not proceed in discrepant areas until discrepancies have been fully resolved.

3.2 INSTALLATION

A. General: Installation shall be in strict conformance with referenced standards, the manufacturer's written directions, as shown on the drawings and as herein specified.

B. Verify invert elevations at points of connection to existing systems prior to any excavation. If invert elevations differ from that shown on drawings, notify Architect immediately.

C. Excavation and Bedding:

1. General: Trench straight and true to line and grade with bottom smooth and free of irregularities or rock points. Trench width in accordance with pipe manufacturer's recommendations and as per the drawings. Follow manufacturer's recommendations for use of each kind and type of pipe.

2. Bedding: Provide bedding as detailed on plans for the full length of the pipe if needed. Bedding shall have a minimum thickness beneath the pipe of 4" or 1/8 the outside diameter of the pipe, which ever is greater. Provide bell holes and depressions for pipe joints only of size required to properly make joint.

3. If the trenches for the site drainage fall within areas to be lime treated, the piping shall be installed prior to any lime treatment operations.

    a. If additional piping is added to previously lime treated areas, the contractor shall backfill the trench with class 2 aggregate base and compact to 95%.

D. Laying of Pipe:

1. General: Inspect pipe prior to placing. Set aside any defective or damaged material. Do not place pipe in water nor place pipe when trenches or weather are unsuitable. Lay pipe upgrade, true to line and grade.

2. Bell and Spigot Joints: Lubricate inside of bells and outside of spigots with soap solution or as recommended by manufacture. Wedge joints tight. Bell of bell and spigot pipe to be pointed upgrade.

3. Pipe shall be bedded uniformly throughout its length.

4. Pipe elevation shall be within 0.04 feet of design elevation as shown on plans.

5. Off Site Work: All work beyond the property lines shall be done in strict conformance with the requirements of the governing agency.

E. Backfilling:

1. General: Do not start backfill operations until required testing has been accomplished, unless approved by the Engineer. The contractor shall be responsible for any work to uncover pipes deemed deficient from the testing or inspection procedure.

2. Trenches and Excavations: Backfill with material as detailed on plans, filling both sides of the pipe at the same time, carefully tamping to hold pipe in place without movement. Refer to Section 31 23 33 – TRENCHING AND BACKFILLING for fill above this layer.

F. Grouting of Pipes: Grout pipes smooth and water tight at drop inlet, manholes, and curb inlets. Grout back side of hood at curb inlets all grouting shall be smooth and consistent.

G. Off Site Work: All work beyond the property lines shall be done in strict conformance with the requirements of the local agency.

H. Cutting and Patching: Remove and replace existing surface features per applicable specification section (i.e. asphaltic concrete or concrete paving) where pipe is installed in areas of existing improvements.

3.3 TOLERANCE

A. Storm Drain structure grates

1. In landscape and lawn areas +- 0.05’.

2. In sidewalk and asphalt pavement +-0.025’.

3. In curb and gutter application +-0.0125’.

B. Cleanout Boxes and Lids

1. In landscape areas; 0.10 higher than surrounding finish grade, +-0.05'.

2. In sidewalks and asphalt pavement; Flush with surrounding finish grade, +-0.025'.

3.4 DEWATERING

A. Contractor to provide trench dewatering as necessary, no matter what the source is, at no additional cost to the owner. Discharge permits from the local or state jurisdictions are the responsibility of the contractor.

3.5 FLUSHING

A. The Contractor shall thoroughly ball and flush the storm drain system to remove all dirt and debris. Discharge water to an approved location.

3.6 CLEANING

A. Upon completion of work of this Section promptly remove from the working area all scraps, debris and surplus material of this Section.

B. Clean the dirt, rocks, and debris from the drop inlets and storm drain manholes.

END OF SECTION 33 40 00

APPENDIX 1

Geotechnical Investigation Report, Fire Station No. 44 Replacement, by Geocon Consultants Inc. – January 2025

PREPARED FOR:

PBK
1110 IRON POINT ROAD, SUITE 200
FOLSOM, CALIFORNIA 95630

PREPARED BY:

GEOCON CONSULTANTS, INC.
6671 BRISA STREET
LIVERMORE, CALIFORNIA 94550

GEOCON PROJECT NO. E9371-04-01

JANUARY 2025

Project No. E9371-04-02
September 12, 2023
Revised January 17, 2025

PBK
1110 Iron Point Road, Suite 200
Folsom, California 95630

Attention: Mr. Austin Duncklee

Subject: COASTSIDE FIRE PROTECTION DISTRICT
COASTSIDE FIRE STATION NO. 44 REPLACEMENT
501 STETSON STREET
MOSS BEACH, CALIFORNIA
GEOTECHNICAL INVESTIGATION

Dear Mr. Duncklee:

In accordance with your authorization, we have performed a design-level geotechnical investigation for the planned replacement of the Coastside Fire Protection District Fire Station No. 44 in Moss Beach, San Mateo County, California. Our investigation was performed to observe the soil and geologic conditions that may impact site development for the project as presently planned. The accompanying report presents the results of our investigation and conclusions and recommendations pertaining to the geotechnical aspects of the proposed project. The findings of this study indicate the site is suitable for development as planned provided the recommendations of this report are implemented during design and construction. We have revised this report from its original version to include the results of supplemental investigation that was performed to evaluate soil conditions at the planned retaining walls along the northern, eastern, and southern margins of the site.

If you have any questions regarding this report, or if we may be of further service, please contact the undersigned at your convenience.

Sincerely,

GEOCON CONSULTANTS, INC.

Jacob Bishop-Moser, PE
Senior Project Engineer

REGISTERED PROFESSIONAL ENGINEER
JACOB E. BISHOP-MOSER
C91625
CIVIL
STATE OF CALIFORNIA

Shane Rodacker, GE
Senior Engineer

REGISTERED PROFESSIONAL ENGINEER
SHANE A. RODACKER
No. 2915
GEOTECHNICAL
STATE OF CALIFORNIA

(1/e-mail) Addressee
(1/e-mail) PBK
Attn: Mr. Jefferson Yu

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GEOTECHNICAL INVESTIGATION

1. PURPOSE AND SCOPE

This report presents the results of a geotechnical investigation for the planned replacement of Coastside Fire Protection District (CFPD) Fire Station No. 44 at 501 Stetson Street in Moss Beach, California (See Vicinity Map, Figure 1). The purpose of this investigation was to evaluate the subsurface soil and geologic conditions in the area of planned development and provide conclusions and recommendations pertaining to the geotechnical aspects of project design and construction, based on the conditions encountered during our study.

The scope of this investigation included field exploration, laboratory testing, engineering analysis and the preparation of this report. Our field exploration was performed on May 19, 2023 and December 10, 2024, and included drilling 7 exploratory borings to depths ranging between approximately 5 and 30 feet below existing grade and advancing two hand auger borings to depths of approximately 4 ½ feet below existing grade. The locations of the soil borings are depicted on the Site Plan, Figure 2. A detailed discussion of our field investigation and soil boring logs are presented in Appendix A.

Laboratory tests were performed on selected soil samples obtained during the investigation to evaluate pertinent geotechnical parameters. In addition, two soil samples were submitted to our laboratory for screening-level corrosion testing. Appendix B presents the laboratory test results in tabular format and graphical format.

The opinions expressed herein are based on analysis of the data obtained during the investigation and our experience with similar soil and geologic conditions. References reviewed to prepare this report are provided in the *List of References* section.

If project details vary significantly from those described herein, Geocon should be contacted to determine the necessity for review and possible revision of this report.

2. SITE CONDITIONS AND PROJECT DESCRIPTION

The project site is a 0.45-acre parcel (San Mateo County APN 037-063-380) situated between Stetson Street and Sierra Street in Moss Beach. A single-family residence abuts the northwestern side of the site. The site is currently occupied by the existing single-story CFPD fire station that includes living quarters, office space and apparatus bays. Relatively short slopes ascend from the northeastern and southeastern site margins to Sierra Street and adjacent single-family residential development, respectively. Site retaining walls are present at the toes of the ascending slopes. The balance of the site is generally flat and level but the western margin slopes gently downward to Stetson Street. Ground surface elevations along the Stetson Street frontage are approximately 129 to 131 feet based on the preliminary grading plans provided by PBK (MCR Engineering, Inc. dated August 2, 2023).

Based on the information provided by PBK, the new station will be situated close to the Stetson Street frontage and will include drive-through apparatus bays, living quarters, office space, a training classroom, and a fitness center. The new station will be one to two stories in height with living spaces on the upper floor and other spaces on the ground floor. The southeastern portion of the new station will be two drive-through apparatus bays that are entered from the rear (northeastern side) of the site and exit toward Stetson Street. The drive aisle will extend east along the site's northwestern margin from Stetson Street to the rear of the site where it will turn to the southwest to enter the apparatus bays. Two driveways off Stetson Street will be located at the northern and southern ends of the frontage. Parking bays will be in the rear of the station, and ADA-accessible parking will be provided on the western side. A generator and fuel tank are planned in the northeastern corner of the site.

New site retaining walls will be constructed to retain ascending slopes at the northern, eastern, and southern site margins. The northern site wall adjacent to 495 Stetson Street will be 1 to 11 ½ feet in retained height, the eastern site wall adjacent to Sierra Street will be 11 ½ to 15 feet in retained height, and the southern site wall adjacent to 506 Sierra Street and 511 Kelmore Street will be 3 ½ to 13 ½ feet in retained height. We have assumed the site walls will be supported by drilled piers due to proximity of the property lines.

Based on the preliminary grading plans, cuts and fills to establish finished subgrade for the fire station pad will be on the order of 2 to 3 feet. Deeper cuts will be necessary for the planned site retaining walls. Ancillary site improvements such as new pedestrian flatwork, underground utilities, landscaping, and fencing are also anticipated.

3. GEOLOGIC SETTING

Moss Beach is located within the Coast Ranges Geomorphic Province of California, which is characterized by a series of northwest trending mountains and valleys along the north and central coast of California. Topography is controlled by the predominant geological structural trends within the Coast Range that generally consist of northwest trending synclines, anticlines and faulted blocks. The dominant structure is a result of both active northwest trending strike-slip faulting, associated with the San Andreas Fault system, and east-west compression within the province.

The San Andreas Fault (SAF) is a major right-lateral strike-slip fault that extends from the Gulf of California in Mexico to Cape Mendocino in northern California. The SAF forms a portion of the boundary between two tectonic plates on the surface of the earth. To the west of the SAF is the Pacific Plate, which moves north relative to the North American Plate, located east of the fault. In the San Francisco Bay Area, movement across this plate boundary is concentrated on the SAF but also distributed, to a lesser extent, across several other faults including the Hayward and Calaveras faults, among others. Together, these faults are referred to as the SAF system.

Basement rock west of the SAF is generally granitic, while to the east it consists of a chaotic mixture of highly deformed marine sedimentary, submarine volcanic and metamorphic rocks of the Franciscan Complex. Both are typically Jurassic to Cretaceous in age (205 to 65 million years old). Overlying the basement rocks are Cretaceous (about 140 to 65 million years old) marine, as well as Tertiary (about 65 to 1.6 million years old) marine and non-marine sedimentary rocks with some continental volcanic rock. These Cretaceous and Tertiary rocks have typically been extensively folded and faulted largely because of movement along the SAF system, which has been ongoing for about the last 25 million years, and regional compression during the last about 4 million years. The inland valleys, as well as the structural depression within which San Francisco Bay is located, are filled with unconsolidated to semi-consolidated deposits of Quaternary age (about the last 1.6 million years). Continental deposits (alluvium) consist of unconsolidated to semi-consolidated sand, silt, clay and gravel, while the bay deposits typically consist of soft organic-rich silt and clay (bay mud) or sand.

Based on geologic mapping by the United States Geological Survey (USGS) and the subsurface conditions encountered in our soil borings, the site is underlain by Pleistocene-age marine terrace deposits.

4. GEOLOGIC HAZARDS

Geologists and seismologists recognize the San Francisco Bay Area as one of the most seismically active regions in the United States. The significant earthquakes that occur in the Bay Area are associated with crustal movements along well-defined active fault zones that generally trend in a northwesterly direction.

The site and greater Bay Area are seismically dominated by the presence of the active San Andreas Fault System. In the theory of plate tectonics, the San Andreas Fault System is a transform fault that forms the boundary between the northward moving Pacific Plate (west of the fault) and the southward moving North American Plate (east of the fault). Locally, the movement is distributed across a complex system of strike-slip, right lateral parallel and subparallel faults, which include the San Andreas, Hayward and Calaveras faults, among others.

The table below presents approximate distances to active faults in the site vicinity based on web-based mapping by the California Geological Survey (CGS). Site latitude and longitude is N 37.3236°, W 121.8641°.

TABLE 4.1
REGIONAL FAULT SUMMARY

Fault Name	Approximate Distance to Site (miles)	Maximum Earthquake Magnitude, M_w
San Gregorio	< ¼	7.4
San Andreas	6 ¾	8.0
Serra Fault Zone	7 ½	7.0
Hayward	24 ½	7.4

Faults tabulated above and many others in the greater Bay Area are sources of potential ground motion. However, earthquakes that might occur on other faults within the northern California area are also potential generators of significant ground motion and could cause ground shaking at the site.

4.1 Surface Fault Rupture

The site is not within a currently established State of California Earthquake Fault Zone Fault Rupture Hazard Zone for surface fault rupture hazards. No active or potentially active faults are known to pass directly beneath the site. Therefore, the potential for surface rupture due to faulting occurring beneath the site during the design life of the proposed development is considered low. By CGS definition, an active fault is one with surface displacement within the last 11,000 years. A potentially active fault has demonstrated evidence of surface displacement with the past 1.6 million years. Faults that have not moved in the last 1.6 million years are typically considered inactive.

4.2 Ground Shaking

We used the web-based *Unified Hazard Tool* application to estimate the peak ground acceleration (PGA) and modal (most probable) magnitude associated with a 2,475-year return period. This return period corresponds to an event with 2% chance of exceedance in a 50-year period. The USGS estimated PGA is 0.94g and the modal magnitude is 7.7 for Seismic Site Class D (V_s30 = 259 m/sec).

While listing PGA is useful for comparison of potential effects of fault activity in a region, other considerations are important in seismic design, including frequency and duration of motion and soil conditions underlying the site.

4.3 Liquefaction

The site is not located within a State of California Seismic Hazard Zone for liquefaction. Liquefaction is a phenomenon in which saturated cohesionless soils are subject to a temporary loss of shear strength due to pore pressure buildup under the cyclic shear stresses associated with intense earthquakes. Primary factors that trigger liquefaction are moderate to strong ground shaking (seismic source), relatively clean, loose granular soils (primarily poorly graded sands and silty sands), and saturated soil conditions (shallow groundwater). Due to the increasing overburden pressure with depth, liquefaction of granular soils is generally limited to the upper 50 feet of a soil profile.

Based on the geologic age and dense nature of the granular soils of the marine terrace deposits and depth to groundwater, we consider the risk of liquefaction at the site to be low.

4.4 Landslides

There are no known landslides near the site, nor is the site in the path of any known or potential landslides. We do not consider the potential for a landslide to be a significant hazard to this project.

4.5 Tsunamis and Seiches

The site is not located within a CGS Tsunami Hazard Area, nor is it located within a San Mateo County tsunami and seiche inundation area as presented in the San Mateo County General Plan. Flooding from a seismically induced tsunami is considered unlikely.

Seiches are large waves generated in enclosed bodies of water in response to ground shaking. No major water-retaining structures are located immediately up gradient from the project site. Flooding from a seismically induced seiche is considered unlikely.

5. SOIL AND GROUNDWATER CONDITIONS

5.1 Artificial Fill

Artificial fill materials were encountered beneath the pavement section in our Boring B1. The artificial fills extended to a depth of approximately 2 ½ feet below existing grade and consisted of stiff sandy clays with asphalt concrete grindings and construction debris. Additional areas of undocumented fill beyond those discussed herein may be present at the site. Undocumented fills may contain constituents not reported herein.

5.2 Alluvium

We encountered alluvial deposits below the artificial fills in our Boring B1 and below the pavement section in our Boring B5 to the maximum depth explored – approximately 5 feet below existing grade. In our Borings B4, B6, B7, HA1, and HA2 alluvium was encountered to depths of approximately 3 ½ to 7 feet below existing grade. As encountered in our borings, the alluvium consisted of medium stiff to very stiff clays with variable amounts of sand and loose to medium dense clayey sands. Our laboratory testing indicates the near-surface clays within the alluvium possesses low to borderline moderate expansion potential.

5.2 Marine Terrace Deposits

We encountered marine terrace deposits below the alluvium in our Borings B4, B6, B7, HA1, and HA2, and below pavement section in our Borings B2 and B3, to the maximum depth explored – approximately 30 feet below existing grade. As encountered in our borings, the marine terrace deposits consisted of medium stiff to very stiff clays with variable amounts of sand, loose to dense clayey sands, and medium dense to dense poorly-graded sands with few to trace clay.

5.3 Groundwater

Groundwater was encountered in our soil borings B2, B3, and B4 at depths of approximately 25 to 27 feet below existing grade. Actual groundwater levels will fluctuate seasonally and with variations in rainfall, temperature and other factors and may be higher or lower than the conditions observed during our study. Additionally, areas of seepage may develop where not previously observed, particularly during or after periods of heavy precipitation.

5.4 Soil Corrosion Screening

Two soil samples obtained during our field exploration were subjected to laboratory testing for minimum resistivity, pH, and chloride and water-soluble sulfate. The laboratory test results and published screening levels are presented in Appendix B. Soil corrosivity should be considered in the design of buried metal pipes, underground structures, etc.

Water-soluble sulfate test results on selected samples of site soils indicate an S0 exposure classification for sulfate attack on normal portland cement concrete (PCC) as defined in Chapter 318, Table 19.3.1.1 of the ACI *Building Code Requirements for Structural Concrete*. ACI does not set forth requirements for S0 sulfate exposure classification. However, one of the soil samples tested would be classified as corrosive to buried metal improvements based on Caltrans pH criteria.

Geocon does not practice in the field of corrosion engineering and mitigation. If corrosion sensitive improvements are planned, it is recommended that a corrosion engineer be retained to evaluate corrosion test results and incorporate the necessary precautions to avoid premature corrosion of buried metal pipes and concrete structures in direct contact with the soils.

6. CONCLUSIONS AND RECOMMENDATIONS

6.1 General

6.1.1 No overriding geotechnical constraints were encountered during our investigation that would preclude the project as presently proposed. Primary geotechnical considerations are the presence of undocumented fills and the potential for strong ground shaking following a seismic event. Remedial grading of the undocumented fills will be required in areas where project improvements are planned.

6.1.2 The proposed project redevelops a site with past episodes of grading and construction. As such, unknown underground improvements and areas of undocumented fill materials, beyond those reported herein, may be present. If encountered, supplemental recommendations will be provided during site development.

6.1.3 Provided the site is graded in accordance with the recommendations of this report and foundation systems are constructed as described herein, we estimate that post-construction settlement due to foundation loads will be less than approximately ¾ inch and corresponding differential settlement will be approximately ½ inch or less across a horizontal distance of 50 feet. Final design foundation loadings should be reviewed by Geocon.

6.1.4 Any changes in the design, location or elevation of the proposed improvements, as outlined in this report, should be reviewed by this office. Geocon should be contacted to determine the necessity for review and possible revision of this report.

6.1.5 All references to relative compaction and optimum moisture content in this report are based on ASTM D 1557 (latest edition).

6.2 Seismic Design Criteria

6.2.1 We understand that seismic structural design will be performed in accordance with the provisions of the 2022 CBC which is based on the American Society of Civil Engineers (ASCE) publication *Minimum Design Loads for Buildings and Other Structures* (ASCE 7-16). We derived the following seismic design parameters using the web-based Structural Engineers Association of California application *U.S. Seismic Design Maps* and the web-based ASCE application *ASCE Hazard Tool*. Results are summarized in Table 6.2.1. The values presented are for the risk-targeted maximum considered earthquake (MCE_R) and Seismic Risk Category III.

TABLE 6.2.1
2022 CBC SEISMIC DESIGN PARAMETERS

Parameter	Value	2022 CBC Reference
Site Class	D	Section 1613.2.2
MCE_R Ground Motion Spectral Response Acceleration – Class B (short), S_S	2.145g	Figure 1613.2.1(1)
MCE_R Ground Motion Spectral Response Acceleration – Class B (1 sec), S_1	0.879g	Figure 1613.2.1(2)
Site Coefficient, F_A	1.0	Table 1613.2.3(1)
Site Coefficient, F_V	1.7*	Table 1613.2.3(2)
Site Class Modified MCE_R Spectral Response Acceleration (short), S_{MS}	2.145g	Section 1613.2.3 (Eqn. 16-36)
Site Class Modified MCE_R Spectral Response Acceleration – (1 sec), S_{M1}	1.494g*	Section 1613.2.3 (Eqn. 16-37)
5% Damped Design Spectral Response Acceleration (short), S_{DS}	1.43g	Section 1613.2.4 (Eqn. 16-38)
5% Damped Design Spectral Response Acceleration (1 sec), S_{D1}	0.996g*	Section 1613.2.4 (Eqn. 16-39)

Note:

*Per Section 11.4.8 of ASCE/SEI 7-16, a ground motion hazard analysis shall be performed for projects for Site Class "E" sites with Ss greater than or equal to 1.0g and for Site Class "D" and "E" sites with S1 greater than 0.2g. Section 11.4.8 also provides exceptions which indicates that the ground motion hazard analysis may be waived provided the exceptions are followed. Using the code based values presented in the table above, in lieu of performing a ground motion hazard analysis, requires the exceptions outlined in ASCE 7-16 Section 11.4.8 be followed.

6.2.2 Table 6.2.2 presents additional seismic design parameters for projects with Seismic Design Categories of D through F in accordance with ASCE 7-16 for the mapped maximum considered geometric mean (MCE_G).

TABLE 6.2.2
2022 CBC SITE ACCELERATION DESIGN PARAMETERS

Parameter	Value	ASCE 7-16 Reference
Mapped MCE_G Peak Ground Acceleration, PGA	0.964g	Figure 22-7
Site Coefficient, F_{PGA}	1.1	Table 11.8-1
Site Class Modified MCE_G Peak Ground Acceleration, PGA_M	1.061g	Section 11.8.3 (Eq. 11.8-1)

6.2.3 Conformance to the criteria presented in Tables 6.2.1 and 6.2.2 for seismic design does not constitute any kind of guarantee or assurance that significant structural damage or ground failure will not occur if a maximum level earthquake occurs. The primary goal of seismic design is to protect life and not to avoid structural damage, since such design may be economically prohibitive.

6.3 Soil and Excavation Characteristics

6.3.1 Based on the subgrade conditions encountered in our exploratory borings, the artificial fills and native alluvial soils and terrace deposits can be excavated with moderate effort using conventional excavation equipment. The fills at the site may contain constituents not reported herein, including oversize materials and construction debris not suitable for reuse in engineered fills. If encountered, supplemental recommendations will be provided during site development.

6.3.2 It is the responsibility of the contractor to ensure that all excavations and trenches are properly shored and maintained in accordance with applicable Occupational Safety and Health Administration (OSHA) rules and regulations to maintain safety and maintain the stability of adjacent existing improvements.

6.3.3 The existing surficial soils encountered at the site are not considered "expansive" (Expansion Index higher than 20) as defined by 2022 CBC.

6.4 Materials for Fill

6.4.1 Soils generated from cut operations or foundation excavations at the site are suitable for use as engineered fill in structural areas provided they do not contain deleterious matter, organic material, or cementations larger than 6 inches in maximum dimension.

6.4.2 Import materials should be primarily granular with a "very low" expansion potential (Expansion Index less than 20), a Plasticity Index less than 15, be free of organic material and construction debris, and not contain rock larger than 6 inches in greatest dimension.

6.4.3 Environmental characteristics and corrosion potential of import soil materials may also be considered. Proposed import materials should be sampled, tested, and approved by Geocon prior to its transportation to the site.

6.5 Grading

6.5.1 All clearing operations and earthwork (including over-excavation, scarification, and recompaction) should be observed and all fills tested for recommended compaction and moisture content by representatives of Geocon.

6.5.2 Structural areas should be considered as areas extending a minimum of 5 feet horizontally from a foundation or beyond the outside dimensions of buildings, including footings and overhangs carrying structural loads, and where not restricted by property boundaries.

6.5.3 A preconstruction conference should be held at the site prior to the beginning of grading operations with the owner, contractor, civil engineer and geotechnical engineer in attendance. Special soil handling requirements can be discussed at that time.

6.5.4 After complete demolition and removal of existing structures, site preparation should commence with the removal of all existing improvements from the area to be developed/graded. All active or inactive utilities within the construction area should be protected, relocated, or abandoned. Any pipelines to be abandoned that are greater than 2 inches and less than 18 inches in diameter should be removed or filled with sand-cement slurry. Utilities larger than 18 inches in diameter should be removed. Excavations or depressions resulting from demolition and site clearing operations, or other existing

excavations or depressions, should be restored with engineered fill in accordance with the recommendations of this report.

6.5.5 Existing soils in the building pad area should be over-excavated to a depth of 12 inches below existing grade or 12 inches below planned building pad grade or to the depth necessary to remove existing undocumented fills (whichever is deepest). The resultant over-excavation bottoms should then be scarified to a depth of approximately 1 foot, moisture conditioned to above optimum moisture (near optimum moisture where materials are predominantly sandy) and recompacted to at least 90% relative compaction.

6.5.6 In general, over-excavated materials may be used for new engineered fill provided they do not contain deleterious matter, organic material, or cementations larger than 6 inches in maximum dimension. Over-excavations and the exposed bottom surfaces and bottom processing should be observed by our representatives. Supplemental recommendations may be provided based on site conditions during grading. Areas of deeper over-excavation may be required.

6.5.7 All structural fill and backfill should be placed in layers no thicker than will allow for adequate bonding and compaction (typically 8 to 12 inches). Fill soils should be placed and compacted to at least 90% relative compaction at above optimum moisture content (near optimum moisture where fill materials are predominantly sandy). Fill areas with in-place density tests showing moisture contents less than those recommended will require additional moisture conditioning prior to placing additional fill.

6.6 Underground Utilities

6.6.1 Underground utility trenches should be backfilled with properly compacted material. The material excavated from the trenches should be adequate for use as backfill provided it does not contain deleterious matter, vegetation or rock larger than six inches in maximum dimension. Trench backfill should be placed in loose lifts not exceeding eight inches and should be compacted to at least 90% relative compaction at above optimum moisture content (near optimum where backfill materials are predominantly sands and gravels).

6.6.2 Bedding and pipe zone backfill typically extends from the bottom of the trench excavations to a minimum of 6 inches above the crown of the pipe. Pipe bedding material should consist of crushed aggregate, clean sand or similar open-graded material. Proposed bedding and pipe zone materials should be reviewed by Geocon prior to construction; open-graded materials such as ¾ inch drain rock may require wrapping with filter fabric to mitigate the potential for piping. Pipe bedding and backfill should also conform to the requirements of the governing utility agency.

6.7 Shallow Foundations

6.7.1 Shallow foundations (footings) founded in competent marine terrace deposits or alluvium, or properly compacted fill, may be used for the new fire station building and ancillary site structures such as generator enclosures, if required. Over-excavations or other provisions may be required if loose or unstable soils are encountered during footing excavations.

6.7.2 It is recommended that conventional continuous footings have a minimum embedment depth of 18 inches below lowest adjacent pad grade. The footings should be at least 12 inches wide. A

continuous strip footing should be provided around the building perimeter. Spread footings should be at least three feet square and integral with strip footings.

6.7.3 Footings proportioned as recommended may be designed for an allowable soil bearing pressure of 3,000 pounds per square foot (psf). The allowable bearing pressure is for dead + live loads may be increased by up to one-third for transient loads due to wind or seismic forces.

6.7.4 The allowable passive pressure used to resist lateral movement of the footings may be assumed to be equal to a fluid weighing 300 pounds per cubic foot (pcf). The allowable coefficient of friction to resist sliding is 0.30 for concrete against soil. Combined passive resistance and friction may be utilized for design provided that the frictional resistance is reduced by 50%.

6.7.5 Minimum reinforcement for continuous footings should consist of four No. 4 steel reinforcing bars; two placed near the top of the footing and two near the bottom. Reinforcement for spread footings should be determined by the structural engineer.

6.7.6 The foundation dimensions and minimum reinforcement recommendations presented herein are based upon soil conditions only and are not intended to be in lieu of those required for structural purposes.

6.7.7 Underground utilities running parallel to footings should not be constructed in the zone of influence of footings. The zone of influence may be taken to be the area beneath the footing and within a 1:1 plane extending out and down from the bottom edge of the footing.

6.7.8 The foundation subgrade should be sprinkled as necessary to maintain a moist condition without significant shrinkage cracks as would be expected in any concrete placement. Our representative should observe all footing excavations prior to placing reinforcing steel.

6.7.9 Where shallow foundation systems are designed and constructed as recommended herein, post-construction settlement due to dead + live loads should be approximately ¾ inch or less with differential settlements of approximately ½ inch across a horizontal distance of 50 feet.

6.8 Concrete Slabs-on-Grade

6.8.1 Concrete slabs-on-grade subject to vehicle loading, such as slabs-on-grade for the apparatus bays, are considered pavements and should be designed in accordance with the recommendations in Section 6.10 of this report.

6.8.2 Concrete slabs-on-grade for the new fire station building should be a minimum of 5 inches thick and minimum slab reinforcement should consist of No. 3 steel reinforcing bars placed 18 inches on center in both horizontal directions. Steel reinforcing should be positioned vertically near the slab midpoint. Final slab thickness and reinforcing should be specified by the project structural engineer.

6.8.3 Interior slabs or slabs in areas where moisture would be objectionable should be underlain by 3 inches of ½-inch or ¾-inch crushed rock with no more than 5% passing the No. 200 sieve to serve as a capillary break.

6.8.4 Exterior slabs, not subject to traffic loads, should be at least 4 inches thick and reinforced with No. 3 steel reinforcing bars placed 18 inches on center in both horizontal directions, positioned near the slab midpoint. We recommend that at least 4 inches of Class 2 Aggregate Base (AB) compacted to at

least 90% relative compaction be used below exterior concrete slabs. Prior to placing AB, the subgrade should be moisture conditioned to above optimum and properly compacted to at least 90% relative compaction.

6.8.5 In lieu of specific recommendations from the structural or civil engineer, we recommend that crack control joints be spaced at intervals not greater than 10 feet for 5-inch slabs (8 feet for 4-inch slabs). Crack control joints should extend a minimum depth of one-fourth the slab thickness and should be constructed using saw-cuts or other methods as soon as practical after concrete placement. Construction joints should be designed by the project structural engineer.

6.8.6 The recommendations of this report are intended to reduce the potential for cracking of slabs due to soil movement. However, even with the incorporation of the recommendations presented herein, foundations, stucco walls, and slabs-on-grade may exhibit some cracking due to soil movement. This is common for project areas that contain expansive soils since designing to eliminate potential soil movement is cost prohibitive. The occurrence of concrete shrinkage cracks is independent of the supporting soil characteristics. Their occurrence may be reduced and/or controlled by limiting the slump of the concrete, proper concrete placement and curing, and by the placement of crack control joints at periodic intervals, in particular, where re-entrant slab corners occur.

6.9 Moisture Protection Considerations

6.9.1 A vapor barrier is not required beneath slab-on-grade for geotechnical purposes. Further, the migration of moisture through concrete slabs or moisture otherwise released from slabs is not a geotechnical issue. However, for the convenience of the owner, we are providing the following general suggestions for consideration by the owner, architect, structural engineer, and contractor. The suggested procedures may reduce the potential for moisture-related floor covering failures on concrete slabs-on-grade, but moisture problems may still occur even if the procedures are followed. If more detailed recommendations are desired, we recommend consulting a specialist in this field.

6.9.2 A vapor barrier meeting ASTM E 1745-09 Class C requirements may be placed directly below the slab, without a sand cushion. To reduce the potential for punctures, a higher quality vapor barrier (15 mil, Class A or B) should be used. The vapor barrier, if used, should extend to the edges of the slab, and should be sealed at all seams and penetrations.

6.9.3 The concrete water/cement ratio should be as low as possible. The water/cement ratio should not exceed 0.45 for concrete placed directly on the vapor barrier. Midrange plasticizers could be used to facilitate concrete placement and workability.

6.9.4 Proper finishing, curing, and moisture vapor emission testing should be performed in accordance with the latest guidelines provided by the American Concrete Institute, Portland Cement Association, and ASTM.

6.10 Pavement Recommendations

6.10.1 The upper 12 inches of pavement subgrade should be scarified, moisture conditioned to above optimum and compacted to at least 95% relative compaction. Prior to placing aggregate base, the finished subgrade should be proof rolled with a laden water truck (or similar equipment with high contact pressure) to verify stability.

6.10.2 Sidewalk, curb, gutter, and driveway encroachments should be designed and constructed in accordance with San Mateo County requirements, as applicable.

6.10.3 Unless specifically designed and evaluated by the project structural engineer, where concrete paving will be utilized for support of apparatus traffic, we recommend the concrete be a minimum of 8 inches thick and reinforced with No. 3 steel reinforcing bars placed 18 inches on center in both horizontal directions. In addition, doweling, reinforcing steel or other load-transfer mechanism should be provided at joints if desired to reduce the potential for vertical offset. The concrete should have a minimum 28-day compressive strength of 3,500 psi. The pavement thickness may be reduced to 5 inches where only passenger car traffic is anticipated.

6.10.4 Consideration should be given to providing a thickened edge on the outside of concrete slabs subject to wheel loads. The thickened edge should be 2 inches thicker than the design slab thicknesses at the slab edge and taper back to the design slab thickness 3 feet behind the face of the slab.

6.10.5 We recommend that at least 6 inches of Class 2 Aggregate Base (AB) be used below rigid concrete pavements. The aggregate base should be compacted to at least 95% relative compaction near optimum moisture content. The AB thickness should be increased to 12 inches minimum where apparatus or heavy truck traffic is anticipated.

6.10.6 In general, we recommend that concrete pavements be designed, constructed and maintained in accordance with industry standards such as those provided by the American Concrete Pavement Association.

6.10.7 Crack control joints should be spaced at intervals not greater than 16 feet for 8-inch-thick slabs and should be constructed using saw-cuts or other methods as soon as practical following concrete placement. Crack control joints should extend a minimum depth of one-fourth the slab thickness and should be constructed using saw-cuts or other methods as soon as practical after concrete placement. Construction joints should be designed by the project structural engineer.

6.10.8 We recommend the following asphalt concrete (AC) pavement sections for design to establish subgrade elevations in pavement areas. The project civil engineer should determine the appropriate Traffic Index (TI) based on anticipated traffic conditions. The flexible pavement sections below are based on estimated design TIs. We can provide additional sections based on other TIs if necessary.

TABLE 6.10
FLEXIBLE PAVEMENT SECTION RECOMMENDATIONS

Location	Estimated Traffic Index (TI)	AC Thickness (inches)	Class 2 Aggregate Base Thickness (inches)
Parking Stalls	4.5	3	7
Light Duty	6.0	3 ½	12
Heavy Duty	8.0	5	16

The recommended flexible pavement sections are based on the following assumptions:

1. Subgrade soil has an R-Value of 10.
2. Class 2 AB has a minimum R-Value of 78 and meets the requirements of Section 26 of the latest Caltrans Standard Specifications.
3. Class 2 AB and subgrade is compacted to 95% or higher relative compaction at or near optimum moisture content. Prior to placing AC, the AB should be proof rolled with a loaded water truck to verify stability.
4. Asphalt concrete should conform to local agency standards.

6.10.9 The performance of pavements is highly dependent upon providing positive surface drainage away from the edge of pavements. Ponding of water on or adjacent to the pavement will likely result in saturation of the subgrade materials and subsequent cracking, subsidence and pavement distress. If planters are planned adjacent to paving, it is recommended that the perimeter curb be extended at least 6 inches below the bottom of the aggregate base to minimize the introduction of water beneath the paving. Alternatives such as plastic moisture cut-offs or modified drop-inlets may also be considered in lieu of deepened curbs.

6.11 Retaining Wall Design

6.11.1 Lateral earth pressures may be used in the design of retaining walls and buried structures. Lateral earth pressures against these facilities may be assumed to be equal to the pressure exerted by an equivalent fluid. The unit weight of the equivalent fluid depends on the design conditions. Table 6.11 summarizes the weights of the equivalent fluid based on the different design conditions.

TABLE 6.11
RECOMMENDED LATERAL EARTH PRESSURES

Condition	Equivalent Fluid Density
Active	40 pcf
At-Rest	60 pcf

6.11.2 Unrestrained walls should be designed using the active case. Unrestrained walls are those that are allowed to rotate more than 0.01H (where H is the height of the wall). Walls restrained from movement such as basement walls should be designed using the at-rest case. The above soil pressures assume level backfill under drained conditions within an area bounded by the wall and a 1:1 plane extending upward from the base of the wall and no surcharges within that same area. Where backfill surfaces are inclined up to 2:1, an additional 15 pcf should be added to the equivalent fluid density values listed in Table 6.11.

6.11.3 Unless project-specific loading information is provided by the structural engineer, where vehicle loads are expected atop the wall backfill, an additional uniform surcharge pressure equivalent to 2 feet of backfill soil should be used for design. Where the vehicle loading will be limited to passenger cars, the additional uniform surcharge equivalent may be reduced to 1 foot of backfill soil.

6.11.4 Where deemed necessary by the project structural engineer or required by building code, retaining walls should be designed considering seismic lateral earth pressure. For level backfill conditions, the seismic lateral earth pressure increment exerted on a cantilever retaining wall should be a triangular distribution with a pressure of 55H (where H is the height of the wall, in feet, resulting in psf) exerted at the base of the wall and zero at the top of the wall. Where slopes up to 2:1 are present above the wall, the dynamic loading component should be taken as $50H^2$ with the resultant force acting 0.35 to 0.4H (where H is the height of the wall) above the base of the wall. Seismic loading should be considered in conjunction with active earth pressures for both restrained and unrestrained (cantilever) walls. Alternatively, where slopes up to 2:1 are present above the wall but plateau within approximately 5 feet measured vertically from the top of wall, the seismic lateral earth pressure increment for the level backfill condition may be used, with H representing the height from the bottom of the wall to the plateau instead of the height of the wall itself.

6.11.5 Retaining walls greater than 2 feet tall (retained height) should be provided with a drainage system adequate to prevent the buildup of hydrostatic forces and should be waterproofed as required by the project architect. Positive drainage for retaining walls should consist of a vertical layer of permeable material positioned between the retaining wall and the soil backfill. The permeable material may be composed of a composite drainage geosynthetic or a natural permeable material such as crushed gravel at least 12 inches thick and capped with at least 12 inches of native soil. A geosynthetic filter fabric should be placed between the gravel and the soil backfill. Provisions for removal of collected water should be provided for either system by installing a perforated drainage pipe along the bottom of the permeable material which leads to suitable drainage facilities.

6.11.6 Passive soil pressure resistance for embedded portions of soldier piles can be based upon an equivalent passive soil fluid weight of 400 pcf. The passive resistance can be assumed to act over a width of two pile diameters. The project structural engineer should determine the actual embedment depth. Where not protected by flatwork or pavement, the upper 1 foot of soil should be neglected when calculating passive resistance to lateral loads. Passive soil resistance should also be ignored where less than 10 feet of cover (measured horizontally) exists between the drilled shaft and a slope face.

6.11.7 Drilled cast-in-place soldier piles should be placed no closer than 3 diameters on center. Structural concrete should be used for the soldier piles.

6.11.8 Casing may be required if caving is experienced in granular soil zones and the contractor should have casing available prior to commencement of drilling activities. When casing is used, extreme care should be employed so that the pile integrity is not compromised as the casing is withdrawn. At no time should the distance between the surface of the concrete and the bottom of the casing be less than 5 feet.

6.11.9 Pier excavations should be clear of loose soil, debris, and standing water prior to placing reinforcing steel. However, groundwater may be encountered within the foundation construction depths and wet wet construction methods may be required if localized dewatering is not successful.

6.11.10 A special concrete mix should be used for concrete to be placed below water. The design should provide for concrete with a 28-day compressive strength psi of 1,000 pounds per square inch (psi) greater than the initial job specification (minimum 4,000 psi). An admixture that reduces segregation of paste/aggregates and dilution of paste should be considered. Concrete below water should be placed via tremie method.

6.11.11 It is essential that the soldier pile system allow very limited amounts of lateral displacement. Earth pressures acting on a lagging wall can result in the movement of the shoring toward the excavation and result in ground subsidence outside of the excavation. For these reasons, we recommend that horizontal movements of the shoring wall be accurately monitored and recorded during excavation and anchor construction. Survey points should be established at both the top and at least one intermediate point between the top of the pile and the base of the excavation on each soldier pile. These points should be monitored on a regular basis during excavation work. Shoring systems, where adjacent offsite structures or improvements do not surcharge the shoring excavation, are typically designed to limit horizontal soldier pile movement to less than 1 inch. Where structures and/or sensitive improvements surcharge the excavations, horizontal soldier pile movement is typically limited to less than ½ inch (or no deflection if movement will damage existing structures). The allowable deflection is dependent on many factors, such as the presence of structures and

utilities near the top of the excavation, and should be assessed and specified by the project retaining wall designer.

6.11.12 We expect that continuous lagging between soldier piles will be required. Lagging should keep pace with excavation and anchor construction. In general, we recommend that the excavation not be advanced deeper than 5 feet below the bottom of lagging at any time although that height may need to be decreased due to soil conditions exposed during excavation. Unlagged gaps should only be allowed to stand for short periods of time in order to decrease the possibility of soil sloughing and caving. Backfilling should be conducted when necessary between the back of lagging and excavation sidewalls to reduce sloughing in this zone.

6.11.13 The condition of existing buildings, streets, sidewalks, and other structures around the perimeter of the planned excavation should be documented prior to the start of shoring and excavation work. Special attention should be given to documenting existing cracks or other indications of differential settlement within these adjacent structures, pavements and other improvements. Consideration should be given to videotaping adjacent underground utilities prior to construction to verify integrity of pipes. In addition, monitoring points should be established indicating location and elevation around the excavation and upon existing buildings. These points should be monitored on a regular basis during construction.

6.11.14 We recommend that all retaining wall designs be reviewed by Geocon to confirm the incorporation of the recommendations provided herein. In particular, potential surcharges from adjacent structures and other improvements should be reviewed by Geocon.

6.11.15 A representative of Geocon should observe the drilling of soldier piles and construction of the shoring system on a continuous basis.

6.12 Surface Drainage

6.12.1 Proper surface drainage is critical to the future performance of the project. Uncontrolled infiltration of irrigation excess and storm runoff into the soils can adversely affect the performance of the planned improvements. Saturation of a soil can cause it to lose internal shear strength and increase its compressibility, resulting in a change to important engineering properties. Proper drainage should be maintained at all times.

6.12.2 All site drainage should be collected and transferred to the street in non-erosive drainage devices. Drainage should not be allowed to pond anywhere on the site, and especially not against any foundations or retaining walls. Drainage should not be allowed to flow uncontrolled over any descending slope. The proposed structures should be provided with roof gutters. Discharge from downspouts, roof drains and scuppers not permitted onto unprotected soils within five feet of the building perimeter. Planters which are located adjacent to foundations should be sealed or properly drained to prevent moisture intrusion into the materials providing foundation support. Landscape irrigation within five feet of the building perimeter footings should be kept to a minimum to just support vegetative life.

6.12.3 Positive site drainage should be provided away from structures, pavement, and the tops of slopes to swales or other controlled drainage structures. The building pad and pavement areas should be fine graded such that water is not allowed to pond. Final soil grade should slope a minimum of 2% away from structures.

6.12.4 We recommend implemented measures to reduce infiltrating surface water near buildings and slabs-on-grade. Such measures may include:

- Selecting drought-tolerant plants that require little or no irrigation, especially within 5 feet of buildings, slabs-on-grade, or pavements.
- Using drip irrigation or low-output sprinklers.
- Using automatic timers for irrigation systems.
- Appropriately spaced area drains.
- Hard-piping roof downspouts to appropriate collection facilities

7. FURTHER GEOTECHNICAL SERVICES

7.1 Plan and Specification Review

7.1.1 We should review project plans and specifications prior to final design submittal to assess whether our recommendations have been properly implemented and evaluate if additional analysis and/or recommendations are required.

7.2 Testing and Observation Services

7.2.1 The recommendations provided in this report are based on the assumption that we will continue as Geotechnical Engineer of Record throughout the construction phase and provide compaction testing and observation services and foundation observations throughout the project. It is important to maintain continuity of geotechnical interpretation and confirm that field conditions encountered are similar to those anticipated during design. If we are not retained for these services, we cannot assume any responsibility for others interpretation of our recommendations, and therefore the future performance of the project.

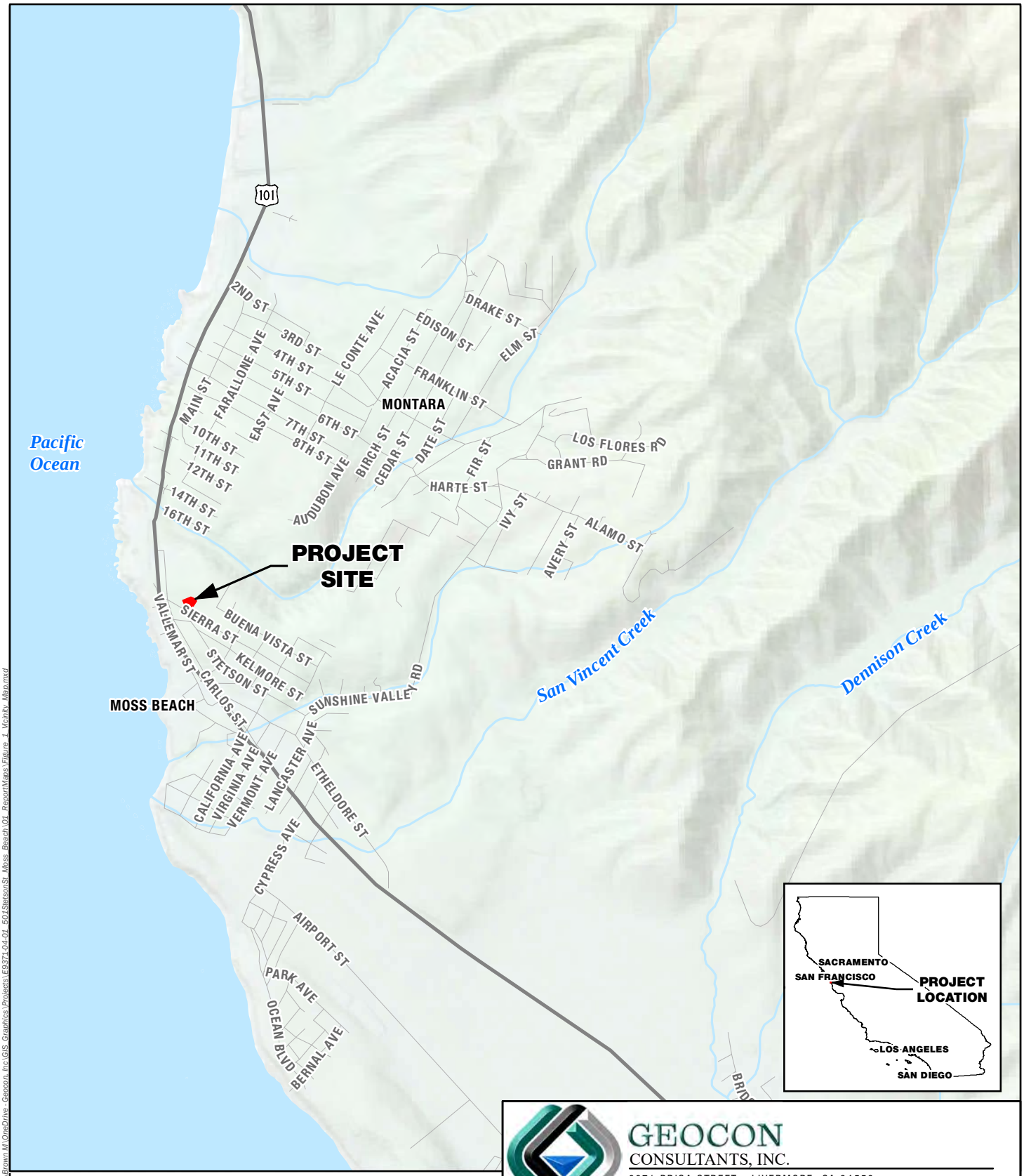
LIMITATIONS AND UNIFORMITY OF CONDITIONS

The recommendations of this report pertain only to the site investigated and are based upon the assumption that the soil conditions do not deviate from those disclosed in the investigation. If any variations or undesirable conditions are encountered during construction, or if the proposed construction will differ from that anticipated herein, Geocon Consultants, Inc. should be notified so that supplemental recommendations can be given. The evaluation or identification of the potential presence of hazardous or corrosive materials was not part of the geotechnical scope of services provided by Geocon Consultants, Inc.

This report is issued with the understanding that it is the responsibility of the owner, or of his representative, to ensure that the information and recommendations contained herein are brought to the attention of the architect and engineer for the project and incorporated into the plans, and the necessary steps are taken to see that the contractor and subcontractors carry out such recommendations in the field.

The findings of this report are valid as of the present date. However, changes in the conditions of a property can occur with the passage of time, whether they are due to natural processes or the works of man on this or adjacent properties. In addition, changes in applicable or appropriate standards may occur, whether they result from legislation or the broadening of knowledge. Accordingly, the findings of this report may be invalidated wholly or partially by changes outside our control. Therefore, this report is subject to review and should not be relied upon after a period of three years.

Our professional services were performed, our findings obtained, and our recommendations prepared in accordance with generally accepted geotechnical engineering principles and practices used in the site area at this time. No warranty is provided, express or implied.



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Scale in Feet

GEOCON
CONSULTANTS, INC.
6671 BRISA STREET - LIVERMORE, CA 94550
PHONE 925.371.5900 - FAX 925.371.5915

Coastside Fire Station No. 44 Replacement

501 Stetson Street
Moss Beach, California

VICINITY MAP

E9371-04-02	January 2025	Figure 1

GEOCON 6/5/2023 USER Brown M PATH C:\Users\Brown M\OneDrive - Geocon, Inc\GIS Graphics\Projects\E9371-04-01_501StetsonSt_Moss_Beach\01_Report\Maps\Figure_1_Vicinity_Map.mxd

Preliminary Grading Plan; PBK Achitects (8/2/2023)

Legend

B5 Approximate Boring Location

Approximate Site Boundary

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0 30

Scale in Feet

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SITE PLAN

E9371-04-02	January 2025	Figure 2

APPENDIX A

APPENDIX A
FIELD EXPLORATION

Fieldwork for our investigation included a site visit, subsurface exploration, and soil sampling. The locations of our exploratory borings are shown on the Site Plan, Figure 2. Soil boring logs for our exploration are presented as figures following the text in this appendix. The borings were located by pacing from existing reference points. Therefore, the exploration locations shown on Figure 2 are approximate.

Our field exploration included seven exploratory soil borings to depths of approximately 30 feet or less. Our borings were performed on May 19, 2023 using a truck-mounted Mobile B-61 drill rig equipped with 8-inch hollow-stem augers and December 10, 2024 using a truck-mounted Simco 2400 SK-1 drill rig equipped with 8-inch hollow-stem augers. Sampling in the borings was accomplished using a down-hole wireline or cathead 140-pound hammer with a 30-inch drop. Samples were obtained with a 3-inch outside-diameter (OD), split spoon (California Modified) sampler, and a 2-inch OD, Standard Penetration Test (SPT) sampler. The number of blows required to drive the sampler the last 12 inches (or fraction thereof) of the 18-inch sampling interval were recorded on the boring logs. The blow counts shown on the boring logs should not be interpreted as standard SPT "N" values; corrections have not been applied. In addition, two soil borings were advanced to depths of approximately 4 ½ feet on December 10, 2024 using hand auger equipment.

Subsurface conditions encountered in the exploratory boring were visually examined, classified and logged in general accordance with the American Society for Testing and Materials (ASTM) Practice for Description and Identification of Soils (Visual-Manual Procedure D2488). This system uses the Unified Soil Classification System (USCS) for soil designations. The log depicts soil and geologic conditions encountered and depths at which samples were obtained. The log also includes our interpretation of the conditions between sampling intervals. Therefore, the logs contain both observed and interpreted data. We determined the lines designating the interface between soil materials on the logs using visual observations, drill rig penetration rates, excavation characteristics and other factors. The transition between materials may be abrupt or gradual. Where applicable, the field logs were revised based on subsequent laboratory testing.

Upon completion, our borings were backfilled per San Mateo County permit requirements.

UNIFIED SOIL CLASSIFICATION

MAJOR DIVISIONS			TYPICAL NAMES	
COARSE-GRAINED SOILS MORE THAN HALF IS COARSER THAN NO. 200 SIEVE	GRAVELS MORE THAN HALF COARSE FRACTION IS LARGER THAN NO.4 SIEVE SIZE	CLEAN GRAVELS WITH LITTLE OR NO FINES	GW	WELL GRADED GRAVELS WITH OR WITHOUT SAND, LITTLE OR NO FINES
			GP	POORLY GRADED GRAVELS WITH OR WITHOUT SAND, LITTLE OR NO FINES
		GRAVELS WITH OVER 12% FINES	GM	SILTY GRAVELS, SILTY GRAVELS WITH SAND
			GC	CLAYEY GRAVELS, CLAYEY GRAVELS WITH SAND
	SANDS MORE THAN HALF COARSE FRACTION IS SMALLER THAN NO.4 SIEVE SIZE	CLEAN SANDS WITH LITTLE OR NO FINES	SW	WELL GRADED SANDS WITH OR WITHOUT GRAVEL, LITTLE OR NO FINES
			SP	POORLY GRADED SANDS WITH OR WITHOUT GRAVEL, LITTLE OR NO FINES
		SANDS WITH OVER 12% FINES	SM	SILTY SANDS WITH OR WITHOUT GRAVEL
			SC	CLAYEY SANDS WITH OR WITHOUT GRAVEL
FINE-GRAINED SOILS MORE THAN HALF IS FINER THAN NO. 200 SIEVE	SILTS AND CLAYS LIQUID LIMIT 50% OR LESS		ML	INORGANIC SILTS AND VERY FINE SANDS, ROCK FLOUR, SILTS WITH SANDS AND GRAVELS
			CL	INORGANIC CLAYS OF LOW TO MEDIUM PLASTICITY, CLAYS WITH SANDS AND GRAVELS, LEAN CLAYS
			OL	ORGANIC SILTS OR CLAYS OF LOW PLASTICITY
	SILTS AND CLAYS LIQUID LIMIT GREATER THAN 50%		MH	INORGANIC SILTS, MICACEOUS OR DIATOMACEOUS, FINE SANDY OR SILTY SOILS, ELASTIC SILTS
			CH	INORGANIC CLAYS OF HIGH PLASTICITY, FAT CLAYS
			OH	ORGANIC CLAYS OR CLAYS OF MEDIUM TO HIGH PLASTICITY
	HIGHLY ORGANIC SOILS		PT	PEAT AND OTHER HIGHLY ORGANIC SOILS

BORING/TRENCH LOG LEGEND

- No Recovery (NOREC)
- Chunk Sample (CHK)
- Shelby Tube Sample (ST)
- Bulk Sample (B)
- Standard Penetration Test Sample (SPT)
- Modified California Sample (MC)
- Continuous Push (CP)
- Groundwater Level (At Time of Drilling)
- Groundwater Level (After Drilling)
- Groundwater Level (Seepage Encountered)

PENETRATION RESISTANCE

SAND AND GRAVEL			SILT AND CLAY			
RELATIVE DENSITY	BLOWS PER FOOT (SPT)*	BLOWS PER FOOT (MOD-CAL)*	CONSISTENCY	BLOWS PER FOOT (SPT)*	BLOWS PER FOOT (MOD-CAL)*	COMPRESSIVE STRENGTH (tsf)
VERY LOOSE	0 - 4	0 - 6	VERY SOFT	0 - 2	0 - 3	0 - 0.25
LOOSE	5 - 10	7 - 16	SOFT	3 - 4	4 - 6	0.25 - 0.50
MEDIUM DENSE	11 - 30	17 - 48	FIRM	5 - 8	7 - 13	0.50 - 1.0
DENSE	31 - 50	49 - 79	STIFF	9 - 15	14 - 24	1.0 - 2.0
VERY DENSE	OVER 50	OVER 79	VERY STIFF	16 - 30	25 - 48	2.0 - 4.0
			HARD	OVER 30	OVER 48	OVER 4.0

*NUMBER OF BLOWS OF 140 LB HAMMER FALLING 30 INCHES TO DRIVE LAST 12 INCHES

MOISTURE DESCRIPTIONS

FIELD TEST	APPROX. DEGREE OF SATURATION, S (%)	DESCRIPTION
NO INDICATION OF MOISTURE; DRY TO THE TOUCH	S<25	DRY
SLIGHT INDICATION OF MOISTURE	25≤S<50	DAMP
INDICATION OF MOISTURE; NO VISIBLE WATER	50≤S<75	MOIST
MINOR VISIBLE FREE WATER	75≤S<100	WET
VISIBLE FREE WATER	100	SATURATED

QUANTITY DESCRIPTIONS

APPROX. ESTIMATED PERCENT	DESCRIPTION
<5%	TRACE
5 - 10%	FEW
11 - 25%	LITTLE
26 - 50%	SOME
>50%	MOSTLY

GRAVEL/COBBLE/BOULDER DESCRIPTIONS

CRITERIA	DESCRIPTION
PASS THROUGH A 3-INCH SIEVE AND BE RETAINED ON A NO. 4 SIEVE (#4 TO 3")	GRAVEL
PASS A 12-INCH SQUARE OPENING AND BE RETAINED ON A 3-INCH SIEVE (3"-12")	COBBLE
WILL NOT PASS A 12-INCH SQUARE OPENING (>12")	BOULDER

BEDDING SPACING DESCRIPTIONS

THICKNESS/SPACING	DESCRIPTOR
GREATER THAN 10 FEET	MASSIVE
3 TO 10 FEET	VERY THICKLY BEDDED
1 TO 3 FEET	THICKLY BEDDED
3 5/8-INCH TO 1 FOOT	MODERATELY BEDDED
1 1/4-INCH TO 3 5/8-INCH	THINLY BEDDED
3/8-INCH TO 1 1/4-INCH	VERY THINLY BEDDED
LESS THAN 3/8-INCH	LAMINATED

STRUCTURE DESCRIPTIONS

CRITERIA	DESCRIPTION
ALTERNATING LAYERS OF VARYING MATERIAL OR COLOR WITH LAYERS AT LEAST 1/4-INCH THICK	STRATIFIED
ALTERNATING LAYERS OF VARYING MATERIAL OR COLOR WITH LAYERS LESS THAN 1/4-INCH THICK	LAMINATED
BREAKS ALONG DEFINITE PLANES OF FRACTURE WITH LITTLE RESISTANCE TO FRACTURING	FISSURED
FRACTURE PLANES APPEAR POLISHED OR GLOSSY, SOMETIMES STRIATED	SLICKENSIDED
COHESIVE SOIL THAT CAN BE BROKEN DOWN INTO SMALLER ANGULAR LUMPS WHICH RESIST FURTHER BREAKDOWN	BLOCKY
INCLUSION OF SMALL POCKETS OF DIFFERENT SOIL, SUCH AS SMALL LENSES OF SAND SCATTERED THROUGH A MASS OF CLAY	LENSED
SAME COLOR AND MATERIAL THROUGHOUT	HOMOGENOUS

CEMENTATION/INDURATION DESCRIPTIONS

FIELD TEST	DESCRIPTION
CRUMBLES OR BREAKS WITH HANDLING OR LITTLE FINGER PRESSURE	WEAKLY CEMENTED/INDURATED
CRUMBLES OR BREAKS WITH CONSIDERABLE FINGER PRESSURE	MODERATELY CEMENTED/INDURATED
WILL NOT CRUMBLE OR BREAK WITH FINGER PRESSURE	STRONGLY CEMENTED/INDURATED

IGNEOUS/METAMORPHIC ROCK STRENGTH DESCRIPTIONS

FIELD TEST	DESCRIPTION
MATERIAL CRUMBLES WITH BARE HAND	WEAK
MATERIAL CRUMBLES UNDER BLOWS FROM GEOLOGY HAMMER	MODERATELY WEAK
1/16-INCH INDENTATIONS WITH SHARP END FROM GEOLOGY HAMMER	MODERATELY STRONG
HAND-HELD SPECIMEN CAN BE BROKEN WITH **ONE** BLOW FROM GEOLOGY HAMMER	STRONG
HAND-HELD SPECIMEN CAN BE BROKEN WITH **COUPLE** BLOWS FROM GEOLOGY HAMMER	VERY STRONG
HAND-HELD SPECIMEN CAN BE BROKEN WITH **MANY** BLOWS FROM GEOLOGY HAMMER	EXTREMELY STRONG

IGNEOUS/METAMORPHIC ROCK WEATHERING DESCRIPTIONS

DEGREE OF DECOMPOSITION	FIELD RECOGNITION	ENGINEERING PROPERTIES
SOIL	DISCOLORED, CHANGED TO SOIL, FABRIC DESTROYED	EASY TO DIG
COMPLETELY WEATHERED	DISCOLORED, CHANGED TO SOIL, FABRIC MAINLY PRESERVED	EXCAVATED BY HAND OR RIPPING (Saprolite)
HIGHLY WEATHERED	DISCOLORED, HIGHLY FRACTURED, FABRIC ALTERED AROUND FRACTURES	EXCAVATED BY HAND OR RIPPING, WITH SLIGHT DIFFICULTY
MODERATELY WEATHERED	DISCOLORED, FRACTURES, INTACT ROCK-NOTICEABLY WEAKER THAN FRESH ROCK	EXCAVATED WITH DIFFICULTY WITHOUT EXPLOSIVES
SLIGHTLY WEATHERED	MAY BE DISCOLORED, SOME FRACTURES, INTACT ROCK-NOT NOTICEABLY WEAKER THAN FRESH ROCK	REQUIRES EXPLOSIVES FOR EXCAVATION, WITH PERMEABLE JOINTS AND FRACTURES
FRESH	NO DISCOLORATION, OR LOSS OF STRENGTH	REQUIRES EXPLOSIVES

IGNEOUS/METAMORPHIC ROCK JOINT/FRACTURE DESCRIPTIONS

FIELD TEST	DESCRIPTION
NO OBSERVED FRACTURES	UNFRACTURED/UNJOINTED
MAJORITY OF JOINTS/FRACTURES SPACED AT 1 TO 3 FOOT INTERVALS	SLIGHTLY FRACTURED/JOINTED
MAJORITY OF JOINTS/FRACTURES SPACED AT 4-INCH TO 1 FOOT INTERVALS	MODERATELY FRACTURED/JOINTED
MAJORITY OF JOINTS/FRACTURES SPACED AT 1-INCH TO 4-INCH INTERVALS WITH SCATTERED FRAGMENTED INTERVALS	INTENSELY FRACTURED/JOINTED
MAJORITY OF JOINTS/FRACTURES SPACED AT LESS THAN 1-INCH INTERVALS; MOSTLY RECOVERED AS CHIPS AND FRAGMENTS	VERY INTENSELY FRACTURED/JOINTED

GEOCON

KEY TO LOGS

SOIL BORING NUMBER: B 1

PROJECT NAME Coastside FS44
LOGGED BY JBM
PROJECT NUMBER E9371-04-01
LATITUDE / LONGITUDE 37.53236, -122.51623
DATE STARTED 05/19/2023 **COMPLETED** 05/19/2023
DEPTH 5' **SURFACE ELEVATION** N/A
LOCATION -
DRILLING FIRM EGI
RIG TYPE Mobile B61
METHOD Hollow Stem Auger **BORING DIAMETER** 8 in
HAMMER TYPE Manual
HAMMER WEIGHT / DROP 140 / 30

Depth (ft)	Graphic Log	USCS	Water Levels	Material Description	Bulk	Driven	Sample Number	Blow Counts/6"	Penetration Resistance (blows/foot)	Pocket Penetrometer (tsf)	Moisture Content (%)	Dry Density (pcf)
				ASPHALT; 3 inches								
				AGGREGATE BASE; 7 inches								
		CL		**FILL** Stiff, moist, black and brown, **Sandy LEAN CLAY**; asphalt concrete grindings and debris noted in spoils			B1-1-5					
		CL		**ALLUVIUM** Stiff, moist, dark brown to black, **Sandy CLAY**, fine to medium grained Becomes medium stiff and brown to orange-brown.			B1-2.5-3 B1-3	7 9 10	19	4.5+	15.4	116.9
							B1-4-4.5 B1-4.5	5 6 7	13		13.4	122.0
5				End of boring at 5'								

Water Levels

- -
- -

HE LOG OF SUBSURFACE CONDITIONS SHOWN APPLIES ONLY TO THE SPECIFIC BORING OR TRENCH LOCATION AT THE DATE INDICATED AND MIGHT NOT REPRESENT SUBSURFACE CONDITIONS AT OTHER LOCATIONS OR TIMES. THE STRATIGRAPHY PRESENTED REPRESENTS THE APPROXIMATE BOUNDARY BETWEEN SOIL TYPES; THESE TRANSITIONS COULD BE GRADUAL.

SOIL BORING NUMBER: B 2

PROJECT NAME Coastside FS44
LOGGED BY JBM
PROJECT NUMBER E9371-04-01
LATITUDE / LONGITUDE 37.53236, -122.51600
DATE STARTED 05/19/2023 **COMPLETED** 05/19/2024
DEPTH 30' **SURFACE ELEVATION** N/A
LOCATION -
DRILLING FIRM EGI
RIG TYPE Mobile B61
METHOD Hollow Stem Auger **BORING DIAMETER** 8 in
HAMMER TYPE Manual
HAMMER WEIGHT / DROP 140 / 30

Depth (ft)	Graphic Log	USCS	Water Levels	Material Description	Bulk	Driven	Sample Number	Blow Counts/6"	Penetration Resistance (blows/foot)	Pocket Penetrometer (tsf)	Moisture Content (%)	Dry Density (pcf)
				ASPHALT; 5 inches								
		CL		**AGGREGATE BASE**; 4 inches								
				TERRACE DEPOSITS								
				Stiff, moist, orange-brown, **Sandy CLAY**, fine to medium grained			B2-2.5-3 B2-3	7 8 9	17	2.5-2 .75	17.9 18.0	110.5
				Sand becomes fine to coarse grained								
				Becomes very stiff.			B2-4-4.5 B2-4.5	6 12 16	28	3.5-4		
5												
							B2-9-9.5 B2-9.5	9 16 22	38	4-4. 5+	18.0	113.1
10												
		SC		Medium dense to dense, moist, orange-brown, **Clayey SAND**, fine to medium grained			B2-14-14.5 B2-14.5	14 18 30	48			
15												
				Less clay.			B2-19-20	11 14 15	29		22.0	

Water Levels

Water encountered @ 25'

-

HE LOG OF SUBSURFACE CONDITIONS SHOWN APPLIES ONLY TO THE SPECIFIC BORING OR TRENCH LOCATION AT THE DATE INDICATED AND MIGHT NOT REPRESENT SUBSURFACE CONDITIONS AT OTHER LOCATIONS OR TIMES. THE STRATIGRAPHY PRESENTED REPRESENTS THE APPROXIMATE BOUNDARY BETWEEN SOIL TYPES; THESE TRANSITIONS COULD BE GRADUAL.

GEOCON	Coastside FS44	Boring No.: B2 Contract No.: E9371-04-01 Page: 2 of 2

Depth (ft)	Graphic Log	USCS	Water Levels	Material Description	Bulk	Driven	Sample Number	Blow Counts/6"	Penetration Resistance (blows/foot)	Pocket Penetrometer (tsf)	Moisture Content (%)	Dry Density (pcf)
		SC										
				Becomes dense.			B2-24-25	12 18 20	38			
25												
				Becomes very dense.			B2-29-30	16 24 30	54			
30												

End of boring at 30'

Water Levels

Water encountered @ 25'

-

HE LOG OF SUBSURFACE CONDITIONS SHOWN APPLIES ONLY TO THE SPECIFIC BORING OR TRENCH LOCATION AT THE DATE INDICATED AND MIGHT NOT REPRESENT SUBSURFACE CONDITIONS AT OTHER LOCATIONS OR TIMES. THE STRATIGRAPHY PRESENTED REPRESENTS THE APPROXIMATE BOUNDARY BETWEEN SOIL TYPES; THESE TRANSITIONS COULD BE GRADUAL.

SOIL BORING NUMBER: B 3

PROJECT NAME Coastside FS44
LOGGED BY JBM
PROJECT NUMBER E9371-04-01
LATITUDE / LONGITUDE 37.53226, -122.51581
DATE STARTED 05/19/2023 **COMPLETED** 05/19/2023
DEPTH 30' **SURFACE ELEVATION** N/A
LOCATION -
DRILLING FIRM EGI
RIG TYPE Mobile B61
METHOD Hollow Stem Auger **BORING DIAMETER** 8 in
HAMMER TYPE Manual
HAMMER WEIGHT / DROP 140 / 30

Depth (ft)	Graphic Log	USCS	Water Levels	Material Description	Bulk	Driven	Sample Number	Blow Counts/6"	Penetration Resistance (blows/foot)	Moisture Content (%)	Dry Density (pcf)
				ASPHALT; 3 inches							
		SC		**AGGREGATE BASE**; 4 inches			B3-1-5				
				TERRACE DEPOSITS Medium dense, moist, orange-brown, **Clayey SAND**, fine to coarse grained		■	B3-2.5-3 B3-3	7 10 18	28	17.0 16.1	125.3
				Slightly less clay noted.		■	B3-4-4.5 B3-4.5	9 11 12	23	17.5	113.2
5											
				Becomes medium dense to dense, note 0.5" diameter pockets and veins of gray, organic-rich clay observed in matrix.		■	B3-9-9.5 B3-9.5	10 20 28	48	19.2	108.4
10											
				Becomes dense, damp to moist, with sand (f-m) and little clay noted.		■	B3-14-15	11 13 20	33	16.0	
15											
						■	B3-19-20	16 18	42		

Water Levels

Water encountered @ 25'

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HE LOG OF SUBSURFACE CONDITIONS SHOWN APPLIES ONLY TO THE SPECIFIC BORING OR TRENCH LOCATION AT THE DATE INDICATED AND MIGHT NOT REPRESENT SUBSURFACE CONDITIONS AT OTHER LOCATIONS OR TIMES. THE STRATIGRAPHY PRESENTED REPRESENTS THE APPROXIMATE BOUNDARY BETWEEN SOIL TYPES; THESE TRANSITIONS COULD BE GRADUAL.

GEOCON	Coastside FS44	Boring No.: B3 Contract No.: E9371-04-01 Page: 2 of 2

Depth (ft)	Graphic Log	USCS	Water Levels	Material Description	Bulk	Driven	Sample Number	Blow Counts/6"	Penetration Resistance (blows/foot)	Moisture Content (%)	Dry Density (pcf)
		SC						16 18 24	42		
				Becomes very dense.			B3-24-25	20 28 40	68		
25											
				Becomes moist.			B3-29-30	14 25 35	60		
30				End of boring at 30'							

Water Levels

Water encountered @ 25'

-

HE LOG OF SUBSURFACE CONDITIONS SHOWN APPLIES ONLY TO THE SPECIFIC BORING OR TRENCH LOCATION AT THE DATE INDICATED AND MIGHT NOT REPRESENT SUBSURFACE CONDITIONS AT OTHER LOCATIONS OR TIMES. THE STRATIGRAPHY PRESENTED REPRESENTS THE APPROXIMATE BOUNDARY BETWEEN SOIL TYPES; THESE TRANSITIONS COULD BE GRADUAL.

SOIL BORING NUMBER: B 4

PROJECT NAME Coastside FS44
LOGGED BY JBM
PROJECT NUMBER E9371-04-01
LATITUDE / LONGITUDE 37.53218, -122.51608
DATE STARTED 05/19/2023 **COMPLETED** 05/19/2023
DEPTH 30' **SURFACE ELEVATION** N/A
LOCATION -
DRILLING FIRM EGI
RIG TYPE Mobile B61
METHOD Hollow Stem Auger **BORING DIAMETER** 8 in
HAMMER TYPE Manual
HAMMER WEIGHT / DROP 140 / 30

Depth (ft)	Graphic Log	USCS	Water Levels	Material Description	Bulk	Driven	Sample Number	Blow Counts/6"	Penetration Resistance (blows/foot)	Pocket Penetrometer (tsf)	Moisture Content (%)	Dry Density (pcf)
				ASPHALT; 3 inches								
				AGGREGATE BASE; 6 inches								
		CL		**ALLUVIUM** Very stiff, moist, dark brown, **Sandy CLAY**, fine to coarse grained			B4-1-5					
							B4-2.5-3 B4-3	7 10 18	28		14.8	116.8
							B4-4-4.5 B4-4.5	9 11 12	23	3.5-4	15.6	116.5
5												
		SC		**TERRACE DEPOSITS** Medium dense, moist, orange-brown, **Clayey SAND**, fine to coarse grained								
							B4-9-9.5 B4-9.5	10 20 28	48		21.8 18.0	110.5
10												
				Less clay noted.			B4-14-14.5 B4-14.5	11 13 20	33			
15												
				Becomes dense, less clay noted.			B4-19-20	16 18 24	42			

Water Levels

Water encountered @ 27'

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HE LOG OF SUBSURFACE CONDITIONS SHOWN APPLIES ONLY TO THE SPECIFIC BORING OR TRENCH LOCATION AT THE DATE INDICATED AND MIGHT NOT REPRESENT SUBSURFACE CONDITIONS AT OTHER LOCATIONS OR TIMES. THE STRATIGRAPHY PRESENTED REPRESENTS THE APPROXIMATE BOUNDARY BETWEEN SOIL TYPES; THESE TRANSITIONS COULD BE GRADUAL.

GEOCON	Coastside FS44	Boring No.: B4 Contract No.: E9371-04-01 Page: 2 of 2

Depth (ft)	Graphic Log	USCS	Water Levels	Material Description	Bulk	Driven	Sample Number	Blow Counts/6"	Penetration Resistance (blows/foot)	Pocket Penetrometer (tsf)	Moisture Content (%)	Dry Density (pcf)
		SC										
				Becomes very dense.			B4-24-25	20 28 40	68			
25												
				Becomes dense.			B4-29-30	14 25 35	60			
30				End of boring at 30'								

Water Levels

Water encountered @ 27'

-

HE LOG OF SUBSURFACE CONDITIONS SHOWN APPLIES ONLY TO THE SPECIFIC BORING OR TRENCH LOCATION AT THE DATE INDICATED AND MIGHT NOT REPRESENT SUBSURFACE CONDITIONS AT OTHER LOCATIONS OR TIMES. THE STRATIGRAPHY PRESENTED REPRESENTS THE APPROXIMATE BOUNDARY BETWEEN SOIL TYPES; THESE TRANSITIONS COULD BE GRADUAL.

SOIL BORING NUMBER: B 5

PROJECT NAME Coastside FS44
LOGGED BY JBM
PROJECT NUMBER E9371-04-01
LATITUDE / LONGITUDE 37.53205, -122.51606
DATE STARTED 05/19/2023 **COMPLETED** 05/19/2023
DEPTH 5' **SURFACE ELEVATION** N/A
LOCATION -
DRILLING FIRM EGI
RIG TYPE Mobile B61
METHOD Hollow Stem Auger **BORING DIAMETER** 8 in
HAMMER TYPE Manual
HAMMER WEIGHT / DROP 140 / 30

Depth (ft)	Graphic Log	USCS	Water Levels	Material Description	Bulk	Driven	Sample Number	Blow Counts/6"	Penetration Resistance (blows/foot)	Moisture Content (%)	Dry Density (pcf)
				ASPHALT; 3 inches							
				AGGREGATE BASE; 7 inches			B5-1-5				
		SC		**ALLUVIUM**							
				Loose, moist, dark brown with orange-brown mottling, **Clayey SAND**, fine to coarse grained			B5-2.5-3	6	15	13.8	
							B5-3	6 9		15.0	113.6
				Becomes medium dense, dark brown.			B5-4-4.5	8 8	18		
5							B5-4.5	10		11.6	117.2

End of boring at 5'

Water Levels

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HE LOG OF SUBSURFACE CONDITIONS SHOWN APPLIES ONLY TO THE SPECIFIC BORING OR TRENCH LOCATION AT THE DATE INDICATED AND MIGHT NOT REPRESENT SUBSURFACE CONDITIONS AT OTHER LOCATIONS OR TIMES. THE STRATIGRAPHY PRESENTED REPRESENTS THE APPROXIMATE BOUNDARY BETWEEN SOIL TYPES; THESE TRANSITIONS COULD BE GRADUAL.

SOIL BORING NUMBER: B 6

PROJECT NAME Coastside FS44
LOGGED BY JBM
PROJECT NUMBER E9371-04-01
LATITUDE / LONGITUDE 37.53252, -122.51583
DATE STARTED 12/10/2024 **COMPLETED** 12/10/2024
DEPTH 30' **SURFACE ELEVATION** N/A
LOCATION -
DRILLING FIRM Cenozoic Exploration
RIG TYPE Simco 2400 SK-1
METHOD Hollow Stem Auger **BORING DIAMETER** 8 in
HAMMER TYPE Cathead
HAMMER WEIGHT / DROP 140 / 30

Depth (ft)	Graphic Log	USCS	Water Levels	Material Description	Bulk	Driven	Sample Number	Blow Counts/6"	Penetration Resistance (blows/foot)	Pocket Penetrometer (tsf)	Moisture Content (%)	Dry Density (pcf)
		SC		**ALLUVIUM** Loose, damp, dark brown, **Clayey SAND**, fine to medium grained, with trace gravel, fine grained		■	B6-2.5 B6-3	4 8 8	16	2.5-3 .25	12.7 13.3	124.9
		SC		**TERRACE DEPOSITS** Loose, damp, orange-brown, **Clayey SAND**, fine to coarse grained; some dark brown mottling noted								
5		CL		Very stiff, damp, orange-brown, **Sandy CLAY**, fine to coarse grained		■	B6-5.5 B6-6	5 12 15	27	4.5+	15.8	117.7
		SC		Medium dense, damp, orange-brown, **Clayey SAND**, fine to coarse grained		■	B6-7.5 B6-8	5 9 10	19	3.5	15.2	117.4
10		CL		Very stiff, damp, orange-brown, **Sandy CLAY**, fine to coarse grained		■	B6-10.5 B6-11	9 19 26	45	3.75- 4	13.8	124.3
15		SC		Medium dense, damp, orange-brown, **Clayey SAND**, fine to coarse grained		■	B6-15.5 B6-16	10 20 27	47	4.25- 4.5+	16.7 16.2	113.4 117.7
		CL		Very stiff, damp, orange-brown, **Sandy CLAY**, fine to coarse grained								

Water Levels

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HE LOG OF SUBSURFACE CONDITIONS SHOWN APPLIES ONLY TO THE SPECIFIC BORING OR TRENCH LOCATION AT THE DATE INDICATED AND MIGHT NOT REPRESENT SUBSURFACE CONDITIONS AT OTHER LOCATIONS OR TIMES. THE STRATIGRAPHY PRESENTED REPRESENTS THE APPROXIMATE BOUNDARY BETWEEN SOIL TYPES; THESE TRANSITIONS COULD BE GRADUAL.

GEOCON	Coastside FS44	Boring No.: B6 Contract No.: E9371-04-01 Page: 2 of 2

Depth (ft)	Graphic Log	USCS	Water Levels	Material Description	Bulk	Driven	Sample Number	Blow Counts/6"	Penetration Resistance (blows/foot)	Pocket Penetrometer (tsf)	Moisture Content (%)	Dry Density (pcf)
		SC		Medium dense, damp, orange-brown, **Clayey SAND**, fine to medium grained		■	B6-20.5 B6-21	10 20 26	46		15.8	115.3
25				Becomes dense, with less clay and with sand (f).		■	B6-25.5 B6-26	7 26 33	59		17.9 17.0	104.2
		SP		Dense, damp to moist, orange-brown, **Poorly Graded SAND**, with trace clay		■	B6-29 B6-29.5	11 20 29	49		13.4	99.3
30				End of boring at 30'								

Water Levels

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HE LOG OF SUBSURFACE CONDITIONS SHOWN APPLIES ONLY TO THE SPECIFIC BORING OR TRENCH LOCATION AT THE DATE INDICATED AND MIGHT NOT REPRESENT SUBSURFACE CONDITIONS AT OTHER LOCATIONS OR TIMES. THE STRATIGRAPHY PRESENTED REPRESENTS THE APPROXIMATE BOUNDARY BETWEEN SOIL TYPES; THESE TRANSITIONS COULD BE GRADUAL.

SOIL BORING NUMBER: B 7

PROJECT NAME Coastside FS44
LOGGED BY JBM
PROJECT NUMBER E9371-04-01
LATITUDE / LONGITUDE 37.53243, -122.51566
DATE STARTED 12/10/2024 **COMPLETED** 12/10/2024
DEPTH 30' **SURFACE ELEVATION** N/A
LOCATION -
DRILLING FIRM Cenozoic Exploration
RIG TYPE Simco 2400 SK-1
METHOD Hollow Stem Auger **BORING DIAMETER** 8 in
HAMMER TYPE Cathead
HAMMER WEIGHT / DROP 140 / 30

Depth (ft)	Graphic Log	USCS	Water Levels	Material Description	Bulk	Driven	Sample Number	Blow Counts/6"	Penetration Resistance (blows/foot)	Moisture Content (%)	Dry Density (pcf)
		SC		**ALLUVIUM** Loose, damp, black/brown, **Clayey SAND**, fine grained, with silt			B7-2.5 B7-3	4 4 5	9	15.9	108.9
5		SC		**TERRACE DEPOSITS** Medium dense, damp, orange-brown, **Clayey SAND**, fine grained Becomes fine to coarse grained.			B7-5.5 B7-6	4 6 9	15		
							B7-7.5 B7-8	4 6 12	18	16.0	117.0
10							B7-10.5 B7-11	6 10 16	26	17.6	112.2
15				Becomes dense, with less clay noted.			B7-15.5 B7-16	13 20 36	56	12.4 12.0	120.3

Water Levels

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HE LOG OF SUBSURFACE CONDITIONS SHOWN APPLIES ONLY TO THE SPECIFIC BORING OR TRENCH LOCATION AT THE DATE INDICATED AND MIGHT NOT REPRESENT SUBSURFACE CONDITIONS AT OTHER LOCATIONS OR TIMES. THE STRATIGRAPHY PRESENTED REPRESENTS THE APPROXIMATE BOUNDARY BETWEEN SOIL TYPES; THESE TRANSITIONS COULD BE GRADUAL.

GEOCON	Coastside FS44	Boring No.: B7 Contract No.: E9371-04-01 Page: 2 of 2

Depth (ft)	Graphic Log	USCS	Water Levels	Material Description	Bulk	Driven	Sample Number	Blow Counts/6"	Penetration Resistance (blows/foot)	Moisture Content (%)	Dry Density (pcf)
		SC		Less clay noted.		■	B7-20.5 B7-21	12 24 27	51	13.9	118.0
25		SP-SC		Medium dense, damp, orange-brown, **Poorly Graded SAND**, fine to medium grained, with few clay		■	B7-25.5 B7-26	10 20 20	40	20.7	
				Becomes dense.		■	B7-29 B7-29.5	12 22 28	50	21.0	97.2
30				End of boring at 30'							

Water Levels

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E: THE LOG OF SUBSURFACE CONDITIONS SHOWN APPLIES ONLY TO THE SPECIFIC BORING OR TRENCH LOCATION AT THE DATE INDICATED AND MIGHT NOT REPRESENT SUBSURFACE CONDITIONS AT OTHER LOCATIONS OR TIMES. THE STRATIGRAPHY PRESENTED REPRESENTS THE APPROXIMATE BOUNDARY BETWEEN SOIL TYPES; THESE TRANSITIONS COULD BE GRADUAL.

SOIL BORING NUMBER: HA 1

PROJECT Coastside FS44
PROJECT NUMBER E9371-04-01
DATE STARTED 12/10/2024 **COMPLETED** 12/10/2024
CONTRACTOR Geocon
METHOD Hand Auger
RIG TYPE - **BORING DIAMETER** 3 in
HAMMER TYPE -

LOGGED BY JBM
LATITUDE / LONGITUDE 37.53234, -122.51567
DEPTH 4.5' **SURFACE ELEVATION** N/A
WATER ENCOUNTER N/A
CLIENT NAME PBK
WATER ENCOUNTER N/A

Depth (ft)	Graphic Log	USCS	Water Levels	Material Description	Bulk	Driven	Sample Number	Blow Counts/6"	Penetration Resistance (blows/foot)
		CL		**ALLUVIUM** Medium stiff, moist, dark brown, **Sandy CLAY**					
		SC		**TERRACE DEPOSITS** Medium dense, moist, orange-brown, **Clayey SAND**, fine to coarse grained					
				End of Boring at 4.5'					

Graphics Legend

CL

SC

Water Levels

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E: THE LOG OF SUBSURFACE CONDITIONS SHOWN APPLIES ONLY TO THE SPECIFIC BORING OR TRENCH LOCATION AT THE DATE INDICATED AND MIGHT NOT REPRESENT SUBSURFACE CONDITIONS AT OTHER LOCATIONS OR TIMES. THE STRATIGRAPHY PRESENTED REPRESENTS THE APPROXIMATE BOUNDARY BETWEEN SOIL TYPES; THESE TRANSITIONS COULD BE GRADUAL.

SOIL BORING NUMBER: HA 2

PROJECT Coastside FS44
PROJECT NUMBER E9371-04-01
DATE STARTED 12/10/2024 **COMPLETED** 12/10/2024
CONTRACTOR Geocon
METHOD Hand Auger
RIG TYPE - **BORING DIAMETER** 3 in
HAMMER TYPE -

LOGGED BY JBM
LATITUDE / LONGITUDE 37.53228, -122.51572
DEPTH 4.5' **SURFACE ELEVATION** N/A
WATER ENCOUNTER N/A
CLIENT NAME PBK
WATER ENCOUNTER N/A

Depth (ft)	Graphic Log	USCS	Water Levels	Material Description	Bulk	Driven	Sample Number	Blow Counts/6"	Penetration Resistance (blows/foot)
		CL		**ALLUVIUM** Medium stiff, moist, dark brown, **Sandy CLAY**					
		SC		**TERRACE DEPOSITS** Medium dense, moist, orange-brown, **Clayey SAND**, fine to coarse grained					

End of Boring at 4.5'

Graphics Legend

SC

CL

Water Levels

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E: THE LOG OF SUBSURFACE CONDITIONS SHOWN APPLIES ONLY TO THE SPECIFIC BORING OR TRENCH LOCATION AT THE DATE INDICATED AND MIGHT NOT REPRESENT SUBSURFACE CONDITIONS AT OTHER LOCATIONS OR TIMES. THE STRATIGRAPHY PRESENTED REPRESENTS THE APPROXIMATE BOUNDARY BETWEEN SOIL TYPES; THESE TRANSITIONS COULD BE GRADUAL.

APPENDIX B

APPENDIX B
LABORATORY TESTING

Laboratory tests were performed in accordance with generally accepted test methods of the American Society for Testing and Materials (ASTM) or other suggested procedures. Selected samples were tested for in-situ dry density and/or moisture content, plasticity, expansion potential, grain size distribution, shear strength, and screening-level corrosion parameters. The results of our testing are summarized in tabular format below and the following figures. In-situ dry density and moisture content test results are included on the boring logs in Appendix A.

TABLE B-I
SUMMARY OF LABORATORY ATTERBERG LIMITS TEST RESULTS
ASTM D 4318

Sample No.	Liquid Limit	Plastic Limit	Plasticity Index
B2-2.5-3	29	12	17
B4-2.5-3	25	13	12
B6-5.5	30	17	13

TABLE B-II
SUMMARY OF LABORATORY EXPANSION INDEX TEST RESULTS
ASTM D 4829

Sample No.	Moisture Content		Dry Density* (pcf)	Expansion Index
	Before Test (%)	After Test (%)		
B2-1-5	8.7	16.9	112.1	5

*before saturation

TABLE B-III
SUMMARY OF LABORATORY GRAIN SIZE ANALYSIS – NO. 200 WASH
ASTM D 1140

Boring No.	Sample Depth (feet)	Fraction Passing No. 200 Sieve (%)
B2	4-4.5	58
B3	2.5-3	36
B4	9-9.5	37
B5	2.5-3	37
B6	25.5	18
B7	15.5	33

APPENDIX B
LABORATORY TESTING (CONT.)

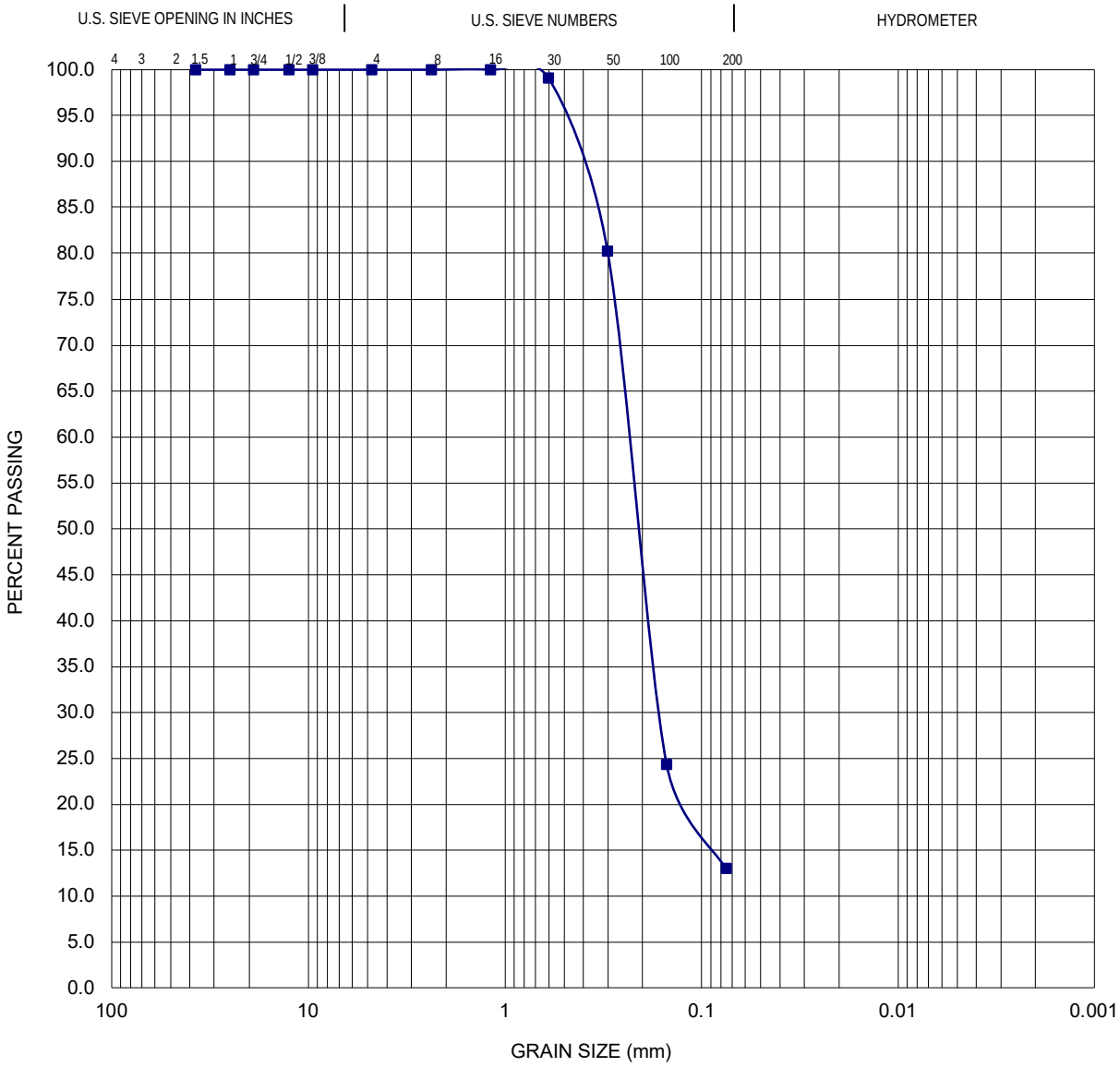
TABLE B-IV
SUMMARY OF SOIL CORROSION PARAMETERS
(CTM 643, CTM 417, CTM 422)

Boring No. (sample depth in feet)	Soil Type (USCS Classification)	Resistivity (ohm-cm)	pH	Chloride (ppm)	Sulfate (ppm)
B3 (4 to 4.5)	Clayey SAND (SC)	2,600	6.5	10	10
B4 (4 to 4.5)	Sandy CLAY (CL)	3,200	5.2	<10	35

*Caltrans considers a site corrosive to foundation elements if one or more of the following conditions exist for the representative soil samples at the site:

- The pH is equal to or less than 5.5.
- Chloride concentration is equal to or greater than 500 parts per million (ppm) or 0.05%.
- Sulfate concentration is equal to or greater than 1,500 ppm (0.15%)

**According to the American Concrete Institute 318 Chapter 19, Type II cement may be used where sulfate levels are below 2,000 ppm (0.2%)



COBBLES	GRAVEL		SAND			SILT OR CLAY
	coarse	fine	coarse	medium	fine	

Boring: B2

Sieve Date: 6/8/23

Depth To Sample: 19'-20'

Tested and Computed by: NR

Test Data

Sieve Number	1 1/2"	1"	3/4"	1/2"	3/8"	#4	#8	#16	#30	#50	#100	#200
% Passing	100	100	100	100	100	100	100	100	99.1	80.2	24.3	13.0

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Fax: (925) 371-5915

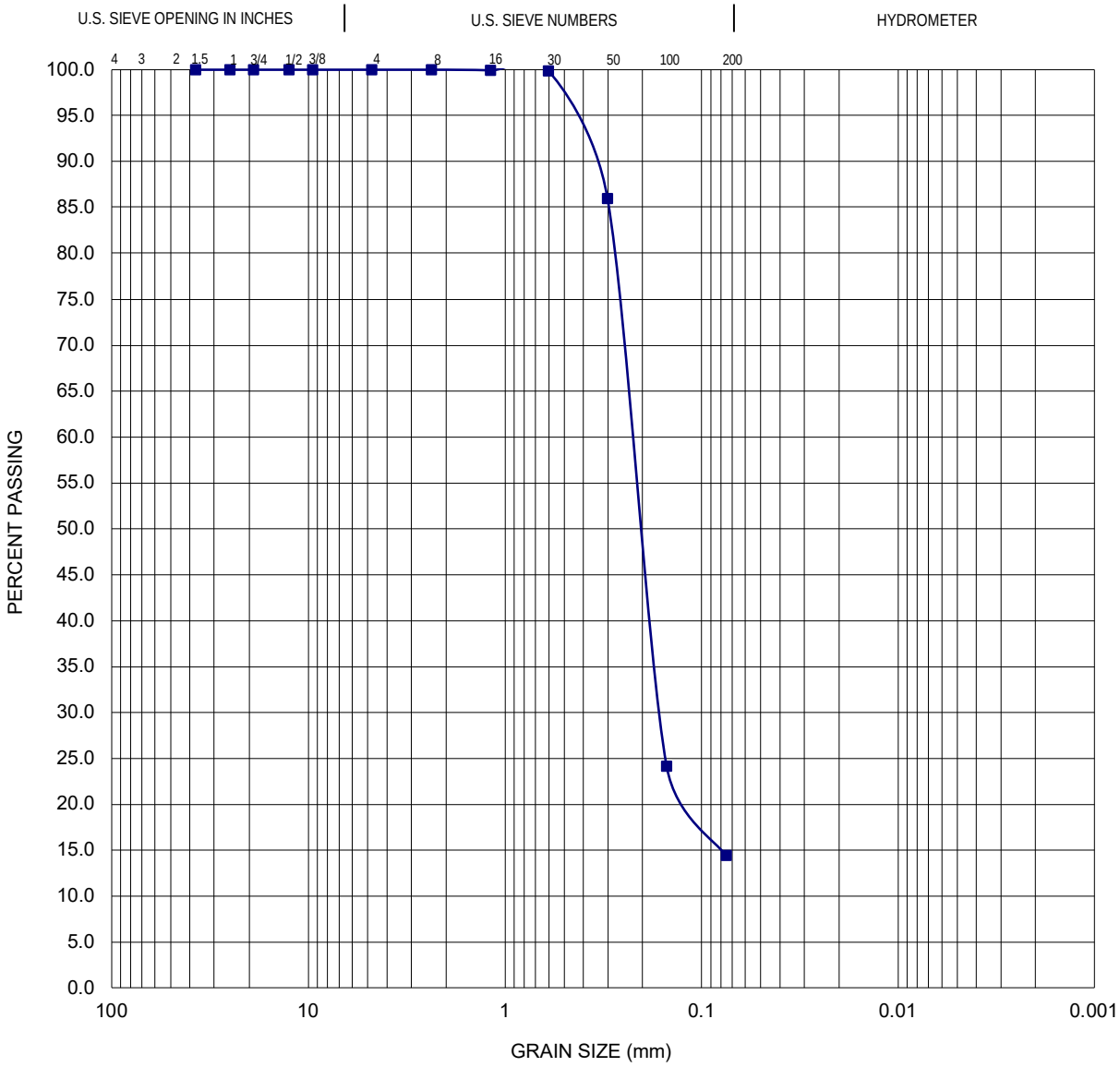
Particle Size Analysis - ASTM D422

Project: Coastside FS44 GI

Location: Moss Beach, CA

Project No.: E9371-04-01

Figure B1



COBBLES	GRAVEL		SAND			SILT OR CLAY
	coarse	fine	coarse	medium	fine	

Boring: B3

Sieve Date: 6/15/23

Depth To Sample: 14'-15'

Tested and Computed by: NR

Test Data

Sieve Number	1 1/2"	1"	3/4"	1/2"	3/8"	#4	#8	#16	#30	#50	#100	#200
% Passing	100	100	100	100	100	100	100	99.9	99.8	86.0	24.1	14.4

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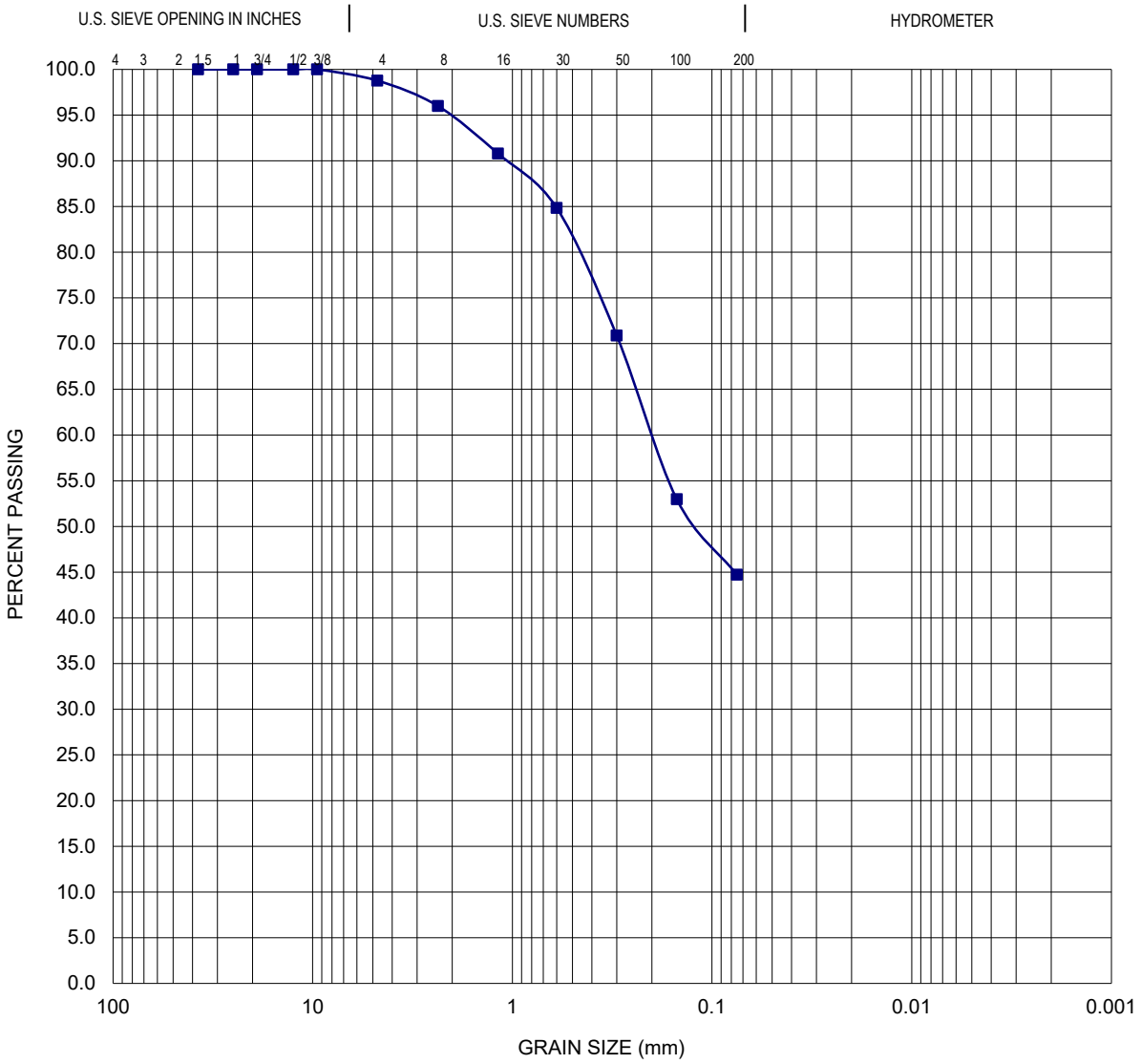
Particle Size Analysis - ASTM D422

Project: Coatside FS44 GI

Location: Moss Beach, CA

Project No.: E9371-04-01

Figure B2



COBBLES	GRAVEL		SAND			SILT OR CLAY
	coarse	fine	coarse	medium	fine	

Boring: B6

Sieve Date: 12/23/2024

Depth To Sample: 2.5

Tested and Computed by: TS

Test Data

Sieve Number	1 1/2"	1"	3/4"	1/2"	3/8"	#4	#8	#16	#30	#50	#100	#200
% Passing	100	100	100	100	100	98.8	96.0	90.8	84.8	70.9	53.0	44.7

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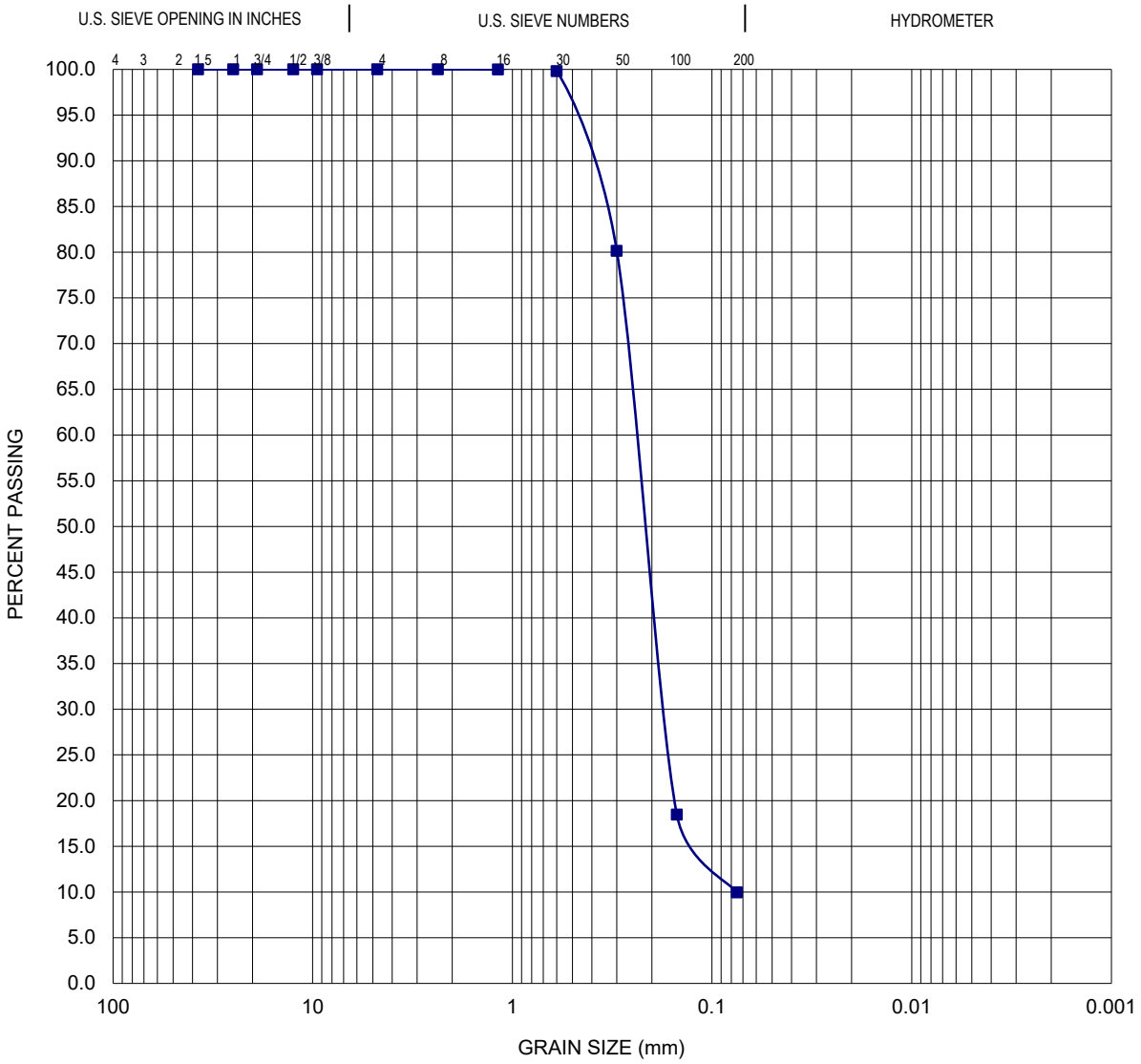
Particle Size Analysis - ASTM D422

Project: Coastside FS44 Supplement

Location: Moss Beach, CA

Project No.: E9371-04-02

Figure B3



COBBLES	GRAVEL		SAND			SILT OR CLAY
	coarse	fine	coarse	medium	fine	

Boring: B7

Sieve Date: 12/23/2024

Depth To Sample: 29.5

Tested and Computed by: TS

Test Data

Sieve Number	1 1/2"	1"	3/4"	1/2"	3/8"	#4	#8	#16	#30	#50	#100	#200
% Passing	100	100	100	100	100	100.0	100.0	100.0	99.8	80.1	18.5	10.0

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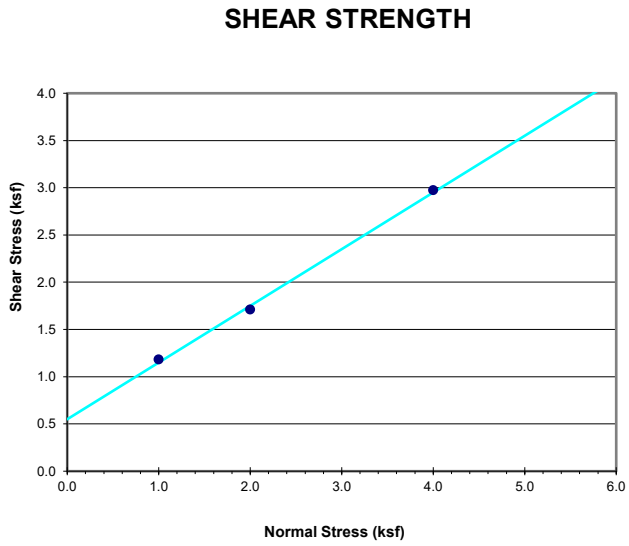
Particle Size Analysis - ASTM D422

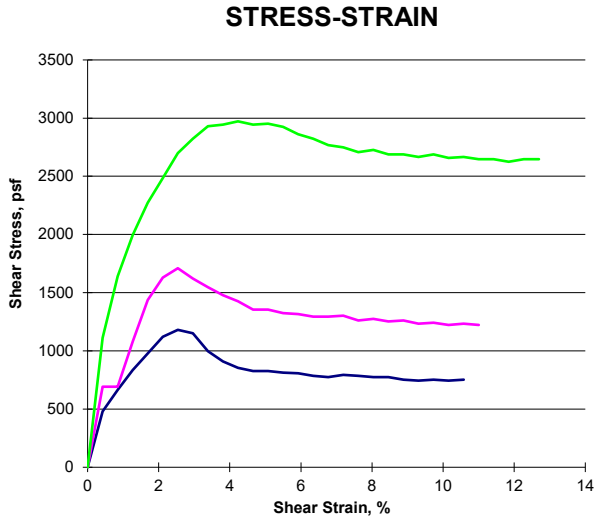
Project: Coastside FS44 Supplement

Location: Moss Beach, CA

Project No.: E9371-04-02

Figure B4





Sample Description			
Boring Number	B2		
Sample Depth (feet)	4.50		
Material Description	Dark yellowish brown Sandy lean CLAY		
Initial Conditions at Start of Test			
Sample ID (psf)	**1000**	**2000**	**4000**
Height (inch)	1.00	1.00	1.00
Diameter (inch)	2.363	2.363	2.363
Moisture Content (%)	16.0	16.0	16.0
Wet Density (pcf)	89.7	119.8	119.8
Dry Density (pcf)	77.3	103.3	103.3
Estimated Specific Gravity	2.65	2.65	2.65
Saturation (%)	37.2	70.5	70.6
Shear Test Conditions			
Strain Rate (%/min)	0.063	0.000	0.000
Major Principal Stress at Failure (psf)	1181	1710	2972
Strain at Failure (%)	2.54	2.54	5.08
Test Results			
ϕ, degrees	**31.0**		
c, psf	**550**		

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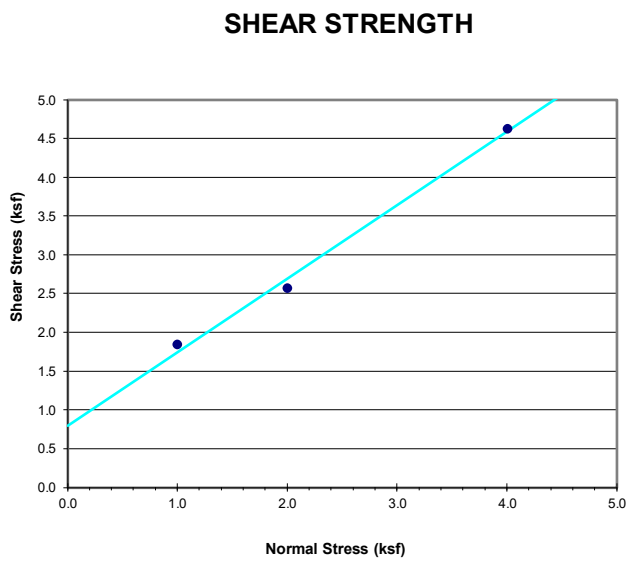
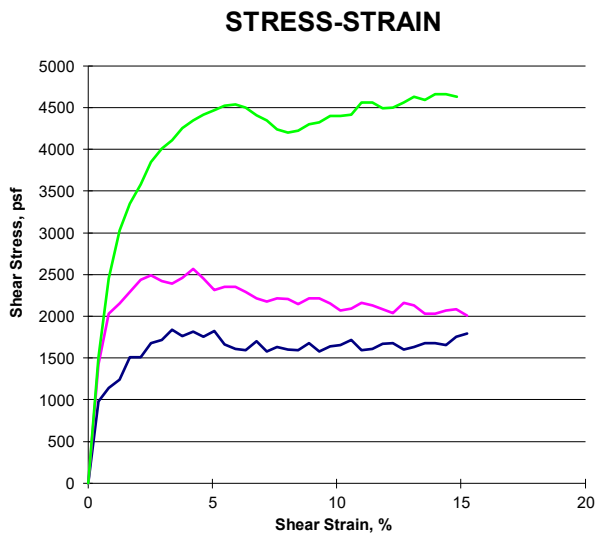
Direct Shear Strength Test (ASTM D3080)

Project: Coastside FS44
Location: Moss Beach, CA
Number: E9371-04-01
Figure: B5





Sample Description			
Boring Number	B6		
Sample Depth (feet)	8.00		
Material Description	Dark Brown and gray Clayey SAND		
Initial Conditions at Start of Test			
Sample ID (psf)	**1000**	**2000**	**4000**
Height (inch)	1.00	1.00	1.00
Diameter (inch)	2.363	2.363	2.363
Moisture Content (%)	15.2	15.2	15.2
Wet Density (pcf)	135.6	134.0	136.0
Dry Density (pcf)	117.7	116.4	118.1
Estimated Specific Gravity	2.80	2.80	2.80
Saturation (%)	87.8	84.9	88.7
Shear Test Conditions			
Strain Rate (%/min)	0.135	0.140	0.134
Major Principal Stress at Failure (psf)	1845	2574	4632
Strain at Failure (%)	3.39	4.23	14.81
Test Results			
ϕ, degrees	**43.5**		
c, psf	**800**		

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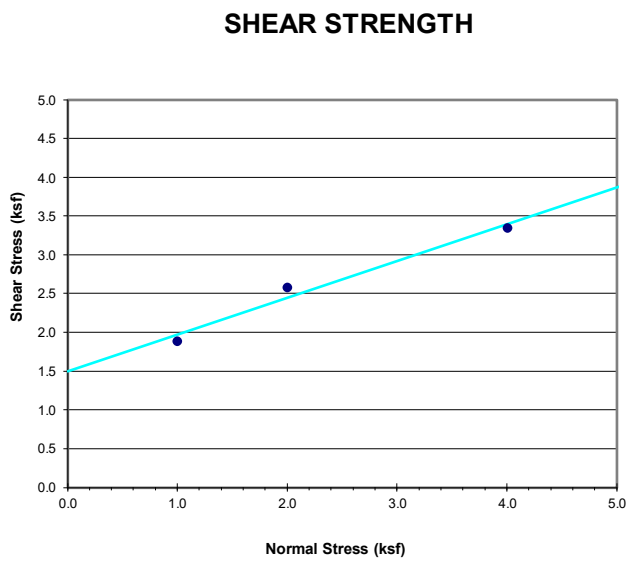
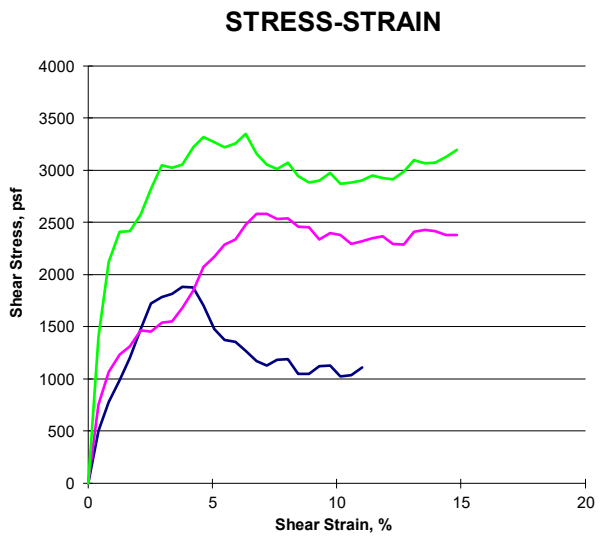
Direct Shear Strength Test (ASTM D3080)

Project: Coastside FS 44
Location: Moss Beach, CA
Number: E9371-04-02
Figure: B6





Sample Description			
Boring Number	B6		
Sample Depth (feet)	15.50		
Material Description	Dark yellowish Brown Sandy lean CLAY		
Initial Conditions at Start of Test			
Sample ID (psf)	**1000**	**2000**	**4000**
Height (inch)	1.00	1.00	1.00
Diameter (inch)	2.363	2.363	2.363
Moisture Content (%)	17.2	16.4	16.5
Wet Density (pcf)	133.0	132.5	131.4
Dry Density (pcf)	113.5	113.8	112.8
Estimated Specific Gravity	2.80	2.80	2.80
Saturation (%)	89.2	85.8	84.0
Shear Test Conditions			
Strain Rate (%/min)	0.138	0.117	0.099
Major Principal Stress at Failure (psf)	1886	2582	3353
Strain at Failure (%)	3.81	7.19	6.35
Test Results			
ϕ, degrees	**25.4**		
c, psf	**1500**		

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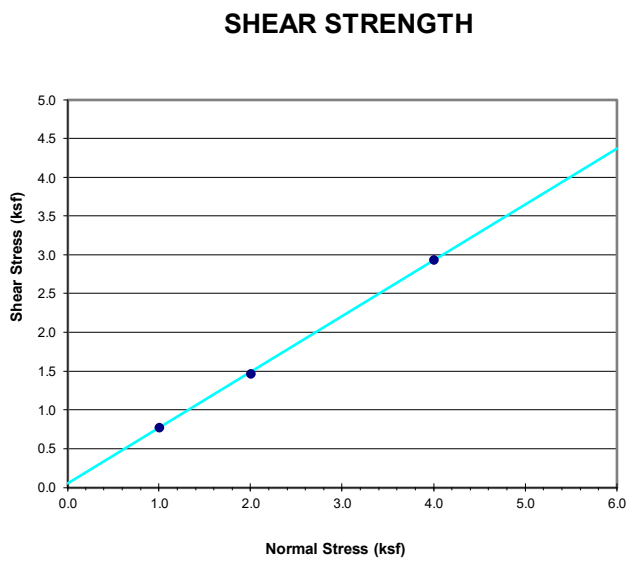
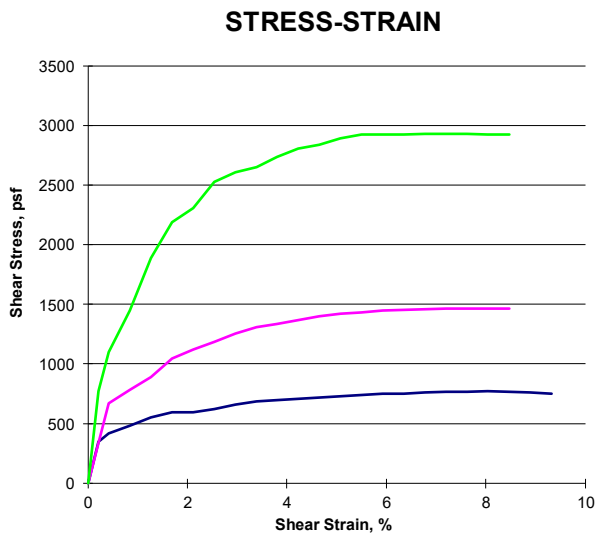
Direct Shear Strength Test (ASTM D3080)

Project: Coastside FS 44
Location: Moss Beach, CA
Number: E9371-04-02
Figure: B7





Sample Description			
Boring Number	B7		
Sample Depth (feet)	3.00		
Material Description	Very Dark Brown Sandy lean CLAY		
Initial Conditions at Start of Test			
Sample ID (psf)	**1000**	**2000**	**4000**
Height (inch)	1.00	1.00	1.00
Diameter (inch)	2.363	2.363	2.363
Moisture Content (%)	16.6	16.0	15.2
Wet Density (pcf)	122.4	126.3	130.1
Dry Density (pcf)	104.9	108.9	112.9
Estimated Specific Gravity	2.70	2.70	2.70
Saturation (%)	74.0	79.1	83.5
Shear Test Conditions			
Strain Rate (%/min)	0.466	0.445	0.423
Major Principle Stress at Failure (psf)	772	1467	2935
Strain at Failure (%)	8.04	8.46	7.62
Test Results			
ϕ, degrees	**35.8**		
c, psf	**50**		

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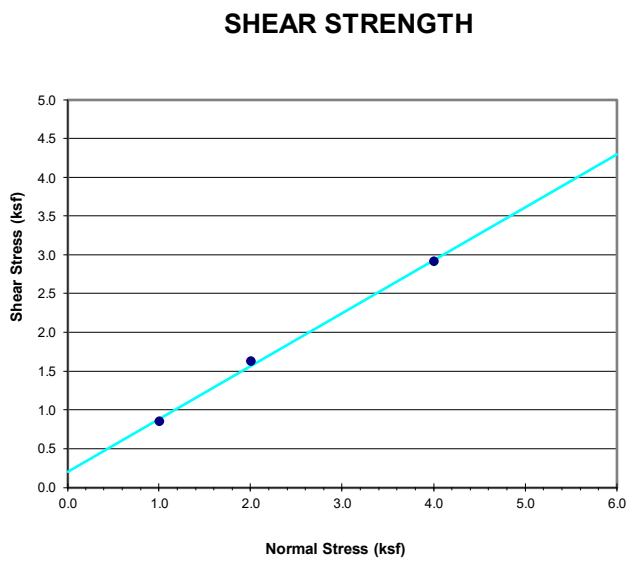
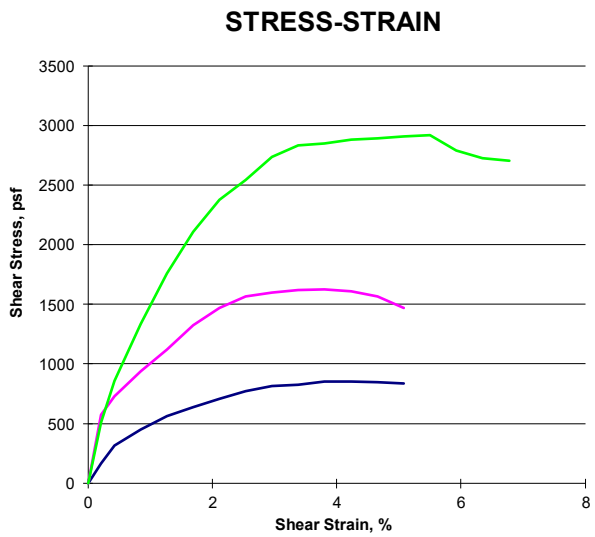
Direct Shear Strength Test (ASTM D3080)

Project: Coastside FS 44
Location: Moss Beach, CA
Number: E9371-04-02
Figure: B8





Sample Description			
Boring Number	B7		
Sample Depth (feet)	21.00		
Material Description	Strong Brown Silty SAND		
Initial Conditions at Start of Test			
Sample ID (psf)	**1000**	**2000**	**4000**
Height (inch)	1.00	1.00	1.00
Diameter (inch)	2.363	2.363	2.363
Moisture Content (%)	13.9	13.9	13.9
Wet Density (pcf)	116.0	122.4	115.6
Dry Density (pcf)	101.8	107.5	101.5
Estimated Specific Gravity	2.70	2.70	2.70
Saturation (%)	57.3	66.1	56.8
Shear Test Conditions			
Strain Rate (%/min)	0.417	0.491	0.467
Major Principle Stress at Failure (psf)	856	1630	2924
Strain at Failure (%)	4.23	4.23	5.50
Test Results			
ϕ, degrees	**34.3**		
c, psf	**200**		

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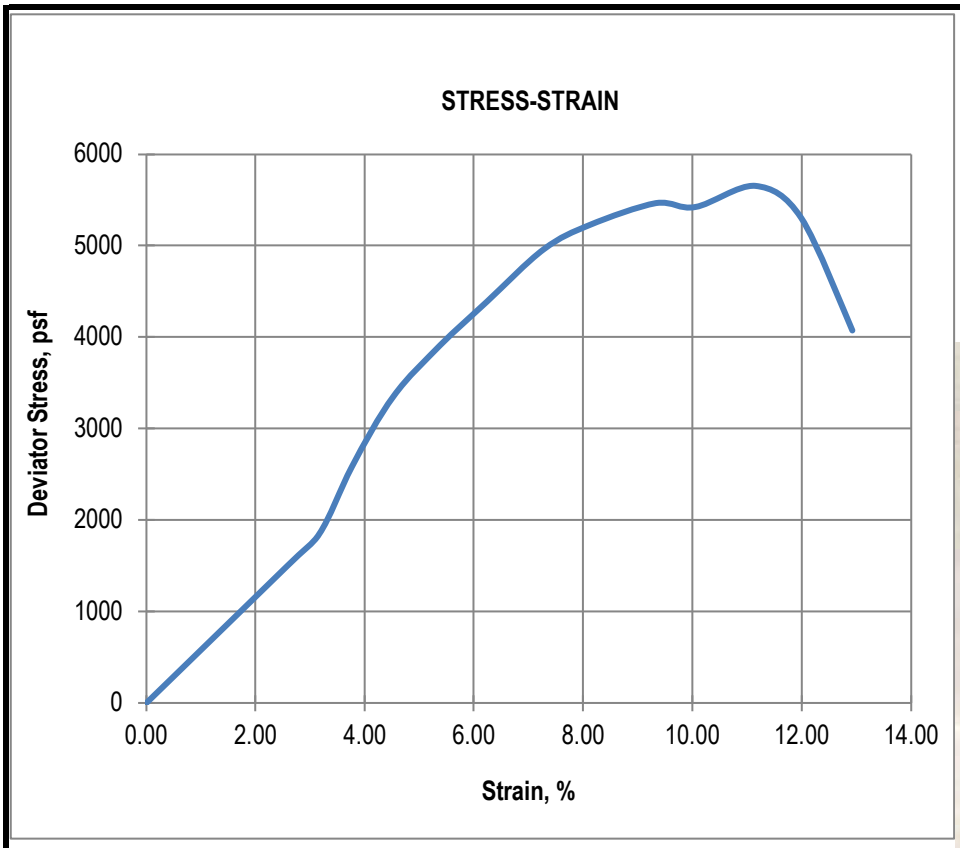
Direct Shear Strength Test (ASTM D3080)

Project: Coastside FS 44
Location: Moss Beach, CA
Number: E9371-04-02
Figure: B9



Failure Photo

Sample Description	
Boring Number	B6
Sample Depth (feet)	6.00
Material Description	Yellow brown sandy clay (trace gravel)
Initial Conditions at Start of Test	
Height (inch) average of 3	4.89
Diameter (inch) average of 3	2.38
Moisture Content (%)	15.8
Dry Density (pcf)	117.7
Estimated Specific Gravity	2.7
Saturation (%)	99.1
Shear Test Conditions	
Strain Rate (%/min)	1.8471
Major Principal Stress at Failure (psf)	5650
Strain at Failure (%)	11.2
Test Results	
Unconfined Compressive Strength (tons/ft^2)	2.8
Unconfined Compressive Strength (lbs/ft^2)	5653
Shear Strength (tons/ft^2)	1.4
Shear Strength (lbs/ft^2)	2827

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Unconfined Compressive Strength (ASTM D2166)

Project: Coastside FS44 Supplement
Location: Moss Beach, CA
Proj. No.: E9371-04-02

Figure B10

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APPENDIX 2

Utility Locating & GPR Utility Scanning, Fire Station No. 44 Replacement, by BESS Utility Solutions, July 9, 2026

BESS
UTILITY SOLUTIONS

2463 Tripaldi Way, Hayward, CA 94545 Tel (408) 988-0101 - Fax (408) 988-0103 www.besstestlab.com
GPR Concrete Scanning - Utility Locating - Potholing - Mobile LiDar 3D Scanning - 3D GPR Imaging

Utility Locating & GPR Utility Scanning

Report For

Project Site:
501 Stetson St
Moss Beach, CA

July 9, 2026

Attention: Sean Rose July 9, 2026
Reference #: P28-6-4303

Scope of Work
BTL was contracted to provide utility locating and GPR utility scanning services on site in Moss Beach, CA. All utilities were requested to be marked by their appropriate designated utility color. Any unknown utilities are to be marked in pink and marked as "unknown".

RF Utility Locating and GPR Utility Scanning Approach

BTL Crew
SUE Foreman: Thomas James O'Brien, IV

Equipment
BTL Locating Crews use RF (Radio Frequency) utility locators combined with GPR (Ground Penetrating Radar) to locate known and unknown underground utilities.

Marking Materials
Markings are done with water based pink paint, pink metal wire flags (bio degradable flags available upon request) and/or wooded laths.

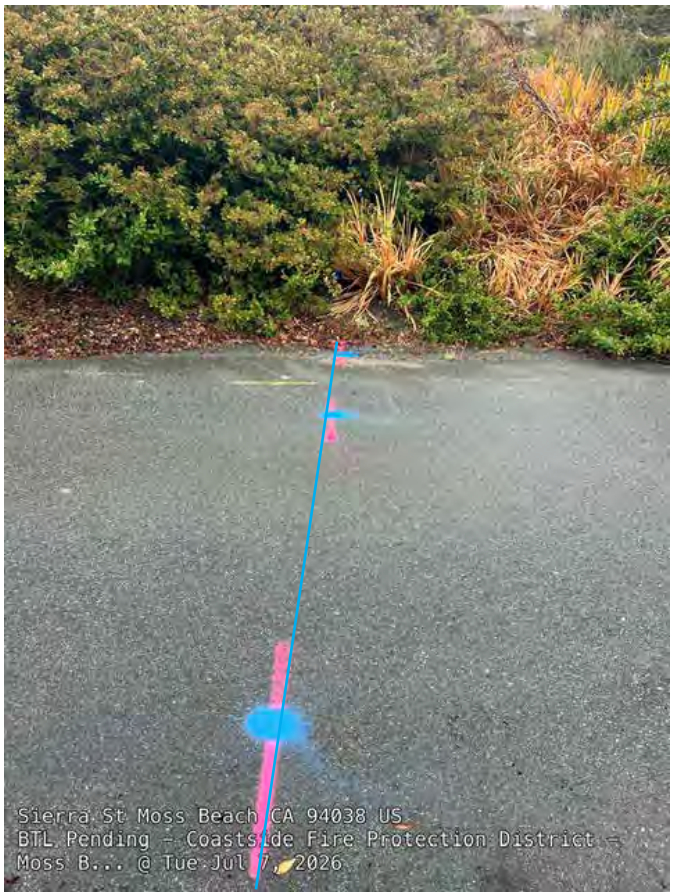
Technical Approach
BTL crews uses the direct connect method when locating underground utilities. Horizontal accuracy of our locators are 6"on each side of markings, although industry standards by law in California allows for 2 feet on each side of markings. Vertical accuracy "Electronic depths" are strictly an estimate. Our Equipment standards suggest our locators are fall with-in 5% of actual depths. Our GPR equipment for utility scanning consist of a 400 MHz and 200MHz antennas.

Results
Designated area was marked and located, our technicians ran GPR to see potential unknown utilities or anomalies that could be threats during excavation work. The following utilities have been located and marked. Electrical, Gas, Water, Communication, Sewer/Storm Drain, Irrigation, and GPR Unknown.

Standard report was put together to display the utilities on images taken in the field. Images are to be used as visual reference, they are not to scale and should not be used for measurements or anything else than their intended purpose. During preparation of report, the job site was reviewed. Special attention was taken to make sure no other utilities were missed as apart of our quality control procedure.

SD/SS WATER ELEC GAS UNKNOWN COMM IRR

SD/SS WATER ELEC GAS UNKNOWN COMM IRR



SD/SS WATER ELEC GAS UNKNOWN COMM IRR

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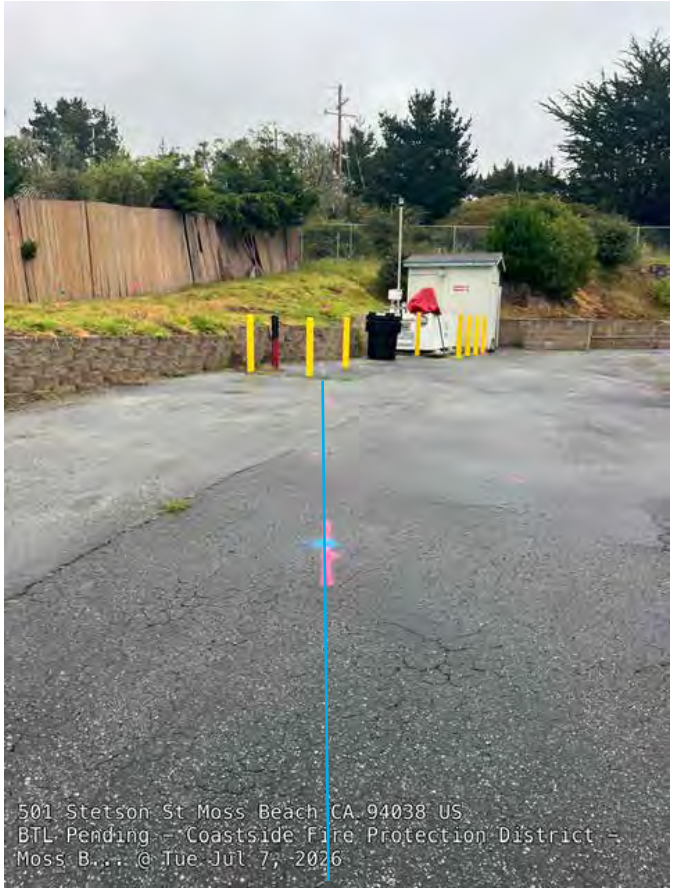

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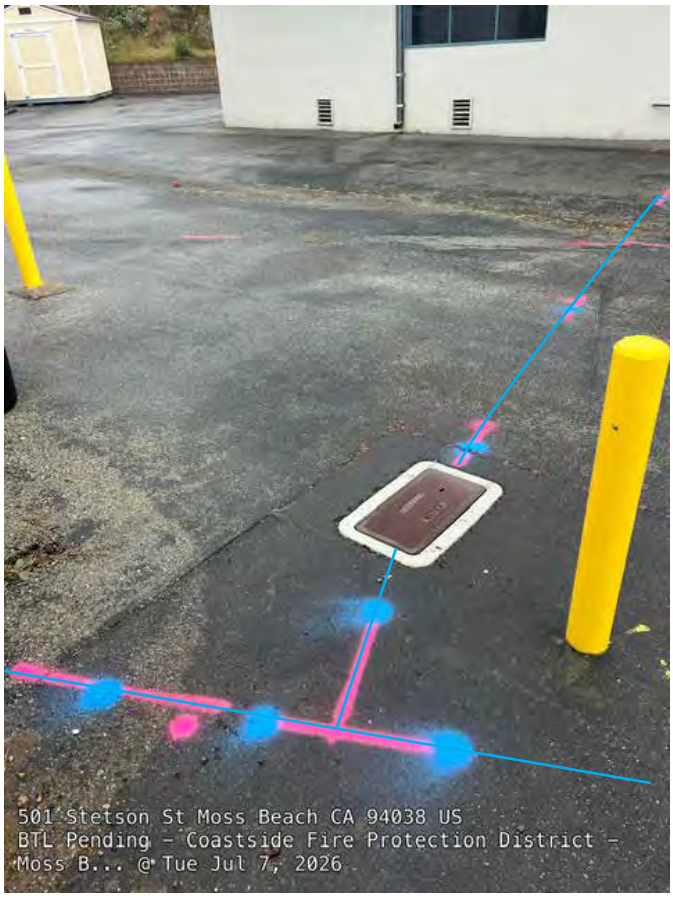

SD/SS WATER ELEC GAS UNKNOWN COMM IRR

SD/SS WATER ELEC GAS UNKNOWN COMM IRR

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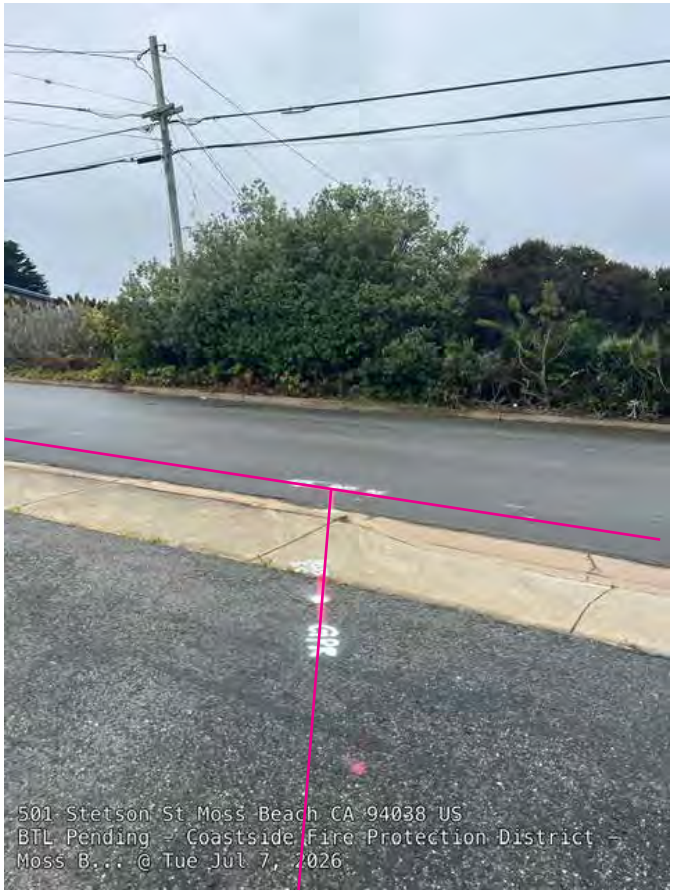

SD/SS WATER ELEC GAS UNKNOWN COMM IRR

SD/SS WATER ELEC GAS UNKNOWN COMM IRR

SD/SS WATER ELEC GAS UNKNOWN COMM IRR

SD/SS WATER ELEC GAS UNKNOWN COMM IRR

SD/SS WATER ELEC GAS UNKNOWN COMM IRR

SD/SS WATER ELEC GAS UNKNOWN COMM IRR

APPENDIX 3

Hazardous Materials Survey Report

Hazardous Materials Survey Report

Station #44
501 Stetson Street
Moss Beach, California

March 30, 2023

Terracon Project No. R1237170

Prepared for:
Gary Silva
Coastside Fire Protection District
1191 Main Street
Half Moon Bay, CA 94019

Prepared by:
Terracon Consultants, Inc.
1220 Concord Avenue, Suite 450
Concord, California 94520
510-547-7771

Report Prepared by: _____Annabelle Call
Industrial Hygienist, CAC # 12-4856

Report Reviewed by: _____Karin Schroeter
Project Manager CAC #92-0772, CDPH #2228

Nationwide
Terracon.com

- Environmental
- Facilities
- Geotechnical
- Materials

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APPENDICES

1. **Laboratory Results and Chain of Custody – Asbestos**
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Hazardous Materials Survey Report

Coastside Fire Protection District
Station #44
501 Stetson Street
Moss Beach, California

1. Executive Summary

The following is a report of the hazardous materials survey conducted by Steve Rogers and Dina Medina, Certified Site Surveillance Technicians (CSSTs) and California Department of Public Health (CDPH) Lead Sampling Technicians with Terracon Consultants, Inc. (Terracon). The survey was performed March 23, 2023 at 501 Stetson Street located in Moss Beach, California.

The survey area included the interior, exterior, and roofing materials associated with the approximately 4,000 square foot building as well as two (2) sheds that are also scheduled for demolition.

A total of twenty-eight (28) suspected asbestos containing materials (ACMs) were identified throughout the interior and exterior of the structures. Eleven (11) of the materials sampled were determined to be positive for asbestos content. One (1) of the materials that was identified was assumed to contain asbestos and not sampled due to the visible damage that would have resulted.

Seven (7) painted surfaces were sampled for potential lead content. Lead was reported in one 1) of the samples in concentrations above the laboratory method detection limit for lead. In addition, Terracon is assuming the 4" shower floor and wall tile contains lead.

Two (2) samples of the sealant were collected for potential polychlorinated biphenyls (PCB) content. Neither sample was reported to contain PCBs above the laboratory method detection limit.

2. Scope of Work

The scope of the survey was as follows:

- Inspect the subject building and two (2) associated sheds for the presence of suspect ACMs, lead-containing paint and other materials, and PCBs containing materials.
- Collect samples of suspect ACMs following a National Emissions Standards for Hazardous Air Pollutants (NESHAPS) protocol for sample collection for a renovation survey.

- Asbestos bulk samples will be analyzed using polarized light microscopy (PLM) in accordance with the EPA's July 1993 method for the determination of asbestos in bulk building materials - EPA 600/R-93/116.

- Collect bulk samples of primary painted surfaces and other materials suspected to be lead containing. Bulk samples will be analyzed at an accredited laboratory by Flame Atomic Absorption (AA) for Total Lead reported in parts per million (ppm).

- PCB samples will be analyzed at an accredited laboratory by GC-ECD.

- Submit written report including analytical results, regulatory requirements, and conclusions.

3. Methods and Sampling Strategy

Visual Inspection

Accessible building materials on the interior and exterior of the structures were visually inspected using the methods presented in the federal Asbestos Hazard Emergency Response Act (AHERA) regulations (40 CFR, Part 763) as a guideline. AHERA was originally only applicable to schools; however State and Federal Occupational Safety and Health Administration (OSHA) and Asbestos School Hazard Abatement Reauthorization Act (ASHARA) have adopted the AHERA sampling methodology for all buildings subject to demolition or renovation.

Bulk Sampling of Asbestos

Bulk samples were collected of homogeneous suspect ACMs. A homogeneous material is defined as a surfacing material, thermal system insulation, or miscellaneous material that is uniform in color, texture, and age of construction. Examples of homogeneous materials include:

- Pipe-insulation produced by the same manufacturer and installed during the same time period.

- Resilient flooring of identical color and pattern.

- Troweled on surfacing materials located in contiguous areas.

The buildings were visually inspected for the presence of suspect materials. As materials were identified, bulk samples were obtained with the aid of a coring device or other hand tool and placed into individual sampling bags. Each sample was given a discrete identification number and recorded on field notes as well as chain-of-custody forms. Refer to accompanying tables and appendices for details on material sample locations and results.

Bulk Sample Analysis - Asbestos

Bulk samples were analyzed by Eurofins EPK Built Environment Testing, LLC (EPK) in Tustin, California. Terracon is accredited under the National Institute of Standards and Technology's National Voluntary Laboratory Accreditation Program (NVLAP).

When None Detected (ND) appears in this report, it should be interpreted as meaning no asbestos was observed in the sample material above the reliable limit of detection for the PLM method.

Note that under EPA assessment criteria, if a single sample of a homogeneous material test positive for asbestos, all areas of that homogeneous material are considered to be asbestos containing.

Bulk Sampling of Lead

Paint chips and samples of other building materials were collected using a hand scraper or chisel and were placed into individual plastic sampling containers. Each sample was provided a discrete sample number, which was recorded on a chain-of-custody form. The samples were transported under chain-of-custody procedures to EPK in Tustin, California. Please refer to Table III for details on sample locations and sample results. All paint samples were analyzed for lead content using Flame Atomic Absorption spectroscopy in accordance with EPA Method SW846-7420.

Bulk Sampling of PCB-containing Material

Samples of the sealant were collected using a hand scraper or chisel and were placed into individual plastic sampling containers. Each sample was provided a discrete sample number, which was recorded on a chain of custody form. The samples were transported under chain of custody procedures to McCampbell Analytical (McCampbell) in Pittsburg, California, for analysis. McCampbell is accredited by the California Department of Public Health Environmental Laboratory Accreditation Program (ELLAP) for the analysis of PCBs. Please refer to Table IV for details on sample locations and sample results.

The sealant samples were analyzed for PCB content using GC-ECD in accordance with analytical EPA Method SW8082. When "<" appears in the PCB sample report, it should be interpreted as meaning below analytical detection limit and no PCB was detected in the sample.

4. Asbestos Results

Twenty-eight (28) suspect homogeneous materials were identified at the subject property. Eleven (11) of these materials were reported positive for asbestos content. One (1) material was assumed to contain asbestos and was not sampled. The materials are listed in Table I below

TABLE I

ASBESTOS-CONTAINING MATERIALS

Material Description	Material Location	Asbestos Type
12" Tan Vinyl Floor Tile - 3 Layers with Yellow and Black Mastics	Kitchen East Side Open Area at West Entry Open Area Northeast Corner	Off-White Floor Tile: ND Black/Yellow Mastic: ND Yellow Mastic: ND Brown Floor Tile: 3% CH Black Mastic: 3% CH Tan Floor Tile: ND Blue Floor Tile: ND Gray Mastic: ND
Tan Vinyl Sheet Flooring Under Wood Flooring and Black Mastics	Restroom at Shower	Tan Sheet Flooring with Fibrous Backing: ND Black Mastic: 3% CH
Textured Drywall with Joint Compound	Restroom at Shower Hallway Southwest Corner Kitchen East Wall Open Area South Wall Room #1 Northwest Side	White Joint Compound w/ Paint: ND Off-White Joint Compound w/ Paint: 2% CH White Drywall w/ Brown Paper: ND Cream Tape: ND Cream Tape w/Paint: ND White Joint Compound: ND
Texture on Drywall	Restroom at Shower Hallway Shower Kitchen East Wall Open Area South Wall Room #1 Northwest Side Open Area West Wall Open Area North Wall	Off-White Texture: 2% CH White Texture: ND Brown Paper w/ Paint: ND Cream Texture: ND
12" Brown Vinyl Floor Tile Under Carpet with Black and Yellow Mastics	Room #2 Northwest Room #2 Northeast Room #1 Northwest	Brown Floor Tile: 3% CH Black Mastic: 3% CH
Drywall with Joint Compound	APP Bay South APP Bay Restroom Southwest APP Bay North	White Joint Compound w/ Paint: 2% CH White Drywall w/ Brown Paper: ND
Texture on Drywall	APP Bay South APP Bay Restroom Southwest APP Bay North APP Bay Southeast APP Bay East	White Texture: ND Off-White Texture: 2% CH
9" Tan/Brown Vinyl Floor Tile with Black Mastic	APP Bay Restroom	Brown/Beige Floor Tile: 3% CH Black Mastic: 3% CH
Stucco and Texture	West Side of App Bay Northwest Side of APP Bay East Side of Building Southeast Side of Building Southwest Side of Building	White Skim Coat: ND Brown Texture: ND Gray Stucco: <1% CH

Material Description	Material Location	Asbestos Type
White Wood Panel/Trim Sealant - Exterior	Southeast Side of building at Wood Panel to Stucco Southeast Side of Building at Wood Panel to Stucco West Side of Building at Entry Wood Overhang to Stucco	White Sealant: ND Tan Sealant: 2% CH
Grey Roof Patch	Compressor Shed	Gray Mastic: 5% CH
4" Yellow Wall and Floor Tile - Ceramic	Not Sampled Material is located in the Restroom Shower	Assumed

NA = Not Applicable, CH = Chrysotile, TR = Tremolite Asbestos

Sixteen (16) suspect materials were sampled and found to be negative for asbestos content. The non-asbestos containing materials are listed in Table II below.

TABLE II
NON-ASBESTOS CONTAINING MATERIALS

Material Description	Material Locations
White Sink Undercoating	Kitchen Sink
Yellow Carpet Mastic	Hallway West Side Hallway East Side Room #4
Brown FRP Mastic	APP Bay North Wall
Concrete Slab	APP Bay East APP Bay Center APP Bay West
Black Window Sealant - Frame to Wood Trim	Glass Windows at Entry
Concrete Sidewalk / Driveway - New	Driveway at APP Building Sidewalk at Southwest APP Building
Concrete Sidewalk - Old	At Building Entry
Asphalt	Southwest Side Southeast Side Northeast Side
CMU Grout on Retaining Wall - Concrete Filled	South Side East Side Northeast Side

Material Description	Material Locations
Drywall with Joint Compound	Generator Shed Southwest Generator Shed Southeast Compressor Shed Southeast
Roofing Shingle with Paper Barrier	Generator Shed
Rolled on Asphaltic Roofing and Paper Barrier	Compressor Shed
Brown Mastic behind 4" Brown Cove Base	APP Bay Restroom
Asphalt Roll-On Roofing – Field	West Lower Roof East Lower Roof West Upper Roof South Upper Roof North Upper Roof
Penetration Mastic	Upper Roof East Upper Roof Center Lower Roof South
Skylight Curb Mastic	Upper Roof East Upper Roof Center Lower Roof South

Any additional materials found during construction activities and not identified in this survey report should be assumed to be ACM.

5. Lead Results

Samples of seven (7) painted surfaces were collected and analyzed for potential lead content. One (1) of the samples was reported above laboratory detection limits for lead. Table III below summarizes the sampling locations and results for the materials. Additional suspect lead containing materials, such as the glazed ceramic tiles in the shower, were not sampled at this time and are assumed to contain lead.

TABLE III
LEAD IN PAINT/TILE SAMPLE RESULTS

Sample Number	Material Description and Location	Results mg/kg (ppm)
Pb-01	Yellow Paint on Drywall Wall Day Room	<39
Pb-02	Dark Tan Paint on Drywall Wall APP Bay	<39
Pb-03	Grey Paint on Drywall Wall APP Bay	<39
Pb-04	**Tan Paint on Wood Ceiling Beam** **APP Bay**	**2,700**
Pb-05	Green Paint on Wood Exterior Trim	<40
Pb-06	Tan Paint on Stucco Exterior Wall Northeast Side	<40
Pb-07	Red Paint on Metal Roof Trim Roof	<39
Not Sampled	**4" Yellow Wall and Floor Tile** **Restroom Shower**	**Assumed**

Mg/kg= Milligram per kilogram, ppm = parts per million

6. PCB Results

Two (2) sealant samples were collected from the exterior of the building and analyzed for PCB content. Both samples were reported below the analytical detection limit for PCBs. Table IV below summarizes the sampling locations and results for the materials.

TABLE IV
PCB SAMPLE RESULTS

Sample Number	Material Description and Location	Results (mg/kg)
PCB-01	White Wood Panel /Trim Sealant Southeast Side of Building	ND<0.50
PCB-02	Black Window Sealant Frame to Wood Trim Class Windows at Entry	ND<0.50

Mg/kg= Milligram per kilogram, ppm = parts per million, ND< = None Detected above analytical limit

7. Conclusions and Recommendations

Based upon the scope of the work, Terracon concludes the following:

- Asbestos was detected in eleven (11) building materials and assumed in one (1) building material identified within the survey area. These materials should be removed by a licensed and registered asbestos abatement contractor if materials disturbed will exceed 100 square feet. All workers shall be professionally trained for asbestos removal work.

- Lead was detected above the laboratory detection limit in one (1) of the materials evaluated and assumed in one (1) building material identified within the survey areas. All removal work impacting lead containing materials must be performed following the OSHA Lead in Construction Standard 8 CCR Section 1532.1.

- PCBs were not detected above the laboratory detection limit in the two (2) sealant samples evaluated.

8. Regulatory Requirements

Asbestos

Asbestos-containing materials are present in the building in concentrations greater than one tenth of one percent (0.1%). Impacting materials containing greater than 0.1% asbestos either through repair, maintenance, or demolition activities triggers numerous regulations enforced by such agencies as OSHA (worker protection) and EPA (environmental exposure, transportation, and disposal).

Listed below are the regulations that apply if the materials are removed:

- If more than 100 square feet of materials that contain greater than 0.1% asbestos will be removed, they must be abated by a Cal-OSHA registered asbestos abatement contractor. Regulation: Cal-OSHA 8 CCR 1529 (R).

- ACMs that are classified by OSHA as other/miscellaneous materials have been confirmed to be present. Removal of these materials is considered a Class II activity according to Cal-OSHA regulations. Work practices and engineering controls for Class II work are specified in Cal-OSHA 8 CCR 1529 (g) (7-8).

Lead

Painted surfaces observed during the survey were all intact. Impacting lead or lead-containing paint either through repair, maintenance, renovation, or demolition activities triggers numerous regulations enforced by such agencies as OSHA (worker protection), EPA (environmental exposure, transportation and disposal), and Department of Public Health (DPH).

Listed below are the lead paint regulations that apply if the paint is removed:

- There are presently no federal, state, or local regulations limiting the concentration of lead in public (non-school) sector buildings, however several regulations established for the private sector as well as for government subsidized housing are relied upon industry-wide as guidelines for assessing exposure to lead. The Consumer Product Safety Commission (CPSC) has set a maximum limit of 90 ppm in paint used for residential purposes. The Department of Housing and Urban Development (HUD) requires abatement of lead hazards involving paint in concentrations exceeding 5,000 ppm.

- Disposal of all lead-containing paint and bulk materials is regulated in concentrations at, or exceeding, 1,000 ppm as stated in 40 Code of Federal Regulations (CFR) Part 263 - Land Disposal Regulations and Title 22, Division 4 Environmental Health of the California Administrative Code. Lead containing materials that exceed 50 ppm must be additionally analyzed to determine possible waste disposal restrictions with respect to lead. However, lead related work at any lead concentration is regulated under the OSHA statutes.

- Federal OSHA as well as California OSHA regulates all worker exposure during construction activities that impact lead-containing paint. California OSHA enforces the Lead in Construction Standard in Title 8 CCR 1532.1. The scope covers construction work where employees may be exposed to lead during such activities as demolition, removal, surface preparation for re-painting, renovation, clean-up, and routine maintenance. The OSHA specified method of compliance includes respiratory protection, protective clothing and equipment, housekeeping, hygiene facilities, medical surveillance, and training, among other requirements.

9. Limitations

Terracon Consultants, Inc. (Terracon) warrants that the findings contained herein have been prepared in general accordance with accepted professional practices as applied by similar professionals in the community at the time of its preparation. Changes in the state of the art or in applicable regulations cannot be anticipated and have not been addressed in this report.

The field and laboratory results reported herein are considered sufficient in detail and scope to determine the presence of ACMs, lead containing materials, mercury and PCBs identified in this report. Also, note that this is a survey report and not an abatement specification. This document is not appropriate for competitive bidding or for use as an asbestos or lead abatement specification.

Appendix 1:

Laboratory Results and Chain of Custody - Asbestos

Report for:

Ms. Karin Schroeter
Terracon Consultants, Inc.-Oakland
1220 Concord Avenue
Suite 450
Concord, CA 94520

Regarding: Eurofins EPK Built Environment Testing, LLC
Project: R1237170; Station #44-50 Stetson St, Moss Beach, CA
EML ID: 3205514

Approved by:

Approved Signatory
Danny Li

Dates of Analysis:
Asbestos PLM: 03-28-2023

Service SOPs: Asbestos PLM (EPA 40CFR App E to Sub E of Part 763 & EPA METHOD 600/R-93-116, SOP EM-AS-S-1267)
NVLAP Lab Code 200757-0

All samples were received in acceptable condition unless noted in the Report Comments portion in the body of the report. The results relate only to the samples as received and tested. The results include an inherent uncertainty of measurement associated with estimating percentages by polarized light microscopy. Measurement uncertainty data for sample results with >1% asbestos concentration can be provided when requested.

Eurofins EPK Built Environment Testing, LLC ("the Company"), a member of the Eurofins Built Environment Testing group of companies, shall have no liability to the client or the client's customer with respect to decisions or recommendations made, actions taken or courses of conduct implemented by either the client or the client's customer as a result of or based upon the Test Results. In no event shall the Company be liable to the client with respect to the Test Results except for the Company's own willful misconduct or gross negligence nor shall the Company be liable for incidental or consequential damages or lost profits or revenues to the fullest extent such liability may be disclaimed by law, even if the Company has been advised of the possibility of such damages, lost profits or lost revenues. In no event shall the Company's liability with respect to the Test Results exceed the amount paid to the Company by the client therefor.

Eurofins EPK Built Environment Testing, LLC
2841 Dow Avenue, Suite 300, Tustin, CA 92780
(866) 888-6653 www.eurofinsus.com/Built

Client: Terracon Consultants, Inc.-Oakland
C/O: Ms. Karin Schroeter
Re: R1237170; Station #44-50 Stetson St, Moss Beach, CA

Date of Sampling: 03-22-2023
Date of Receipt: 03-23-2023
Date of Report: 03-28-2023

ASBESTOS PLM REPORT

Total Samples Submitted:	85
Total Samples Analyzed:	85
Total Samples with Layer Asbestos Content > 1%:	21

Location: 01A, 12" Tan VFT-3 Layers and Yellow and Black Mastics; Kitchen East Side

Lab ID-Version‡: 15525269-1

Sample Layers	Asbestos Content
Off-White Floor Tile	ND
Black/Yellow Mastic	ND
Brown Floor Tile	3% Chrysotile
Black Mastic	3% Chrysotile
Tan Floor Tile	ND
Gray Mastic	ND
Sample Composite Homogeneity:	Poor

Location: 01B, 12" Tan VFT-3 Layers and Yellow and Black Mastics; Open Area at West Entry

Lab ID-Version‡: 15525270-1

Sample Layers	Asbestos Content
Off-White Floor Tile	ND
Black Mastic 1	ND
Brown Floor Tile	3% Chrysotile
Black Mastic 2	3% Chrysotile
Yellow Mastic	ND
Tan Floor Tile	ND
Gray Mastic	ND
Sample Composite Homogeneity:	Poor

The test report shall not be reproduced except in full, without written approval of the laboratory. The report must not be used by the client to claim product certification, approval, or endorsement by any agency of the federal government. The Company reserves the right to dispose of all samples after a period of thirty (30) days, according to all state and federal guidelines, unless otherwise specified.

Inhomogeneous samples are separated into homogeneous subsamples and analyzed individually. ND means no fibers were detected. When detected, the minimum detection and reporting limit is less than 1% unless point counting is performed. Floor tile samples may contain large amounts of interference material and it is recommended that the sample be analyzed by gravimetric point count analysis to lower the detection limit and to aid in asbestos identification.
‡ A "Version" indicated by -"x" after the Lab ID# with a value greater than 1 indicates a sample with amended data. The revision number is reflected by the value of "x".

Eurofins EPK Built Environment Testing, LLC
2841 Dow Avenue, Suite 300, Tustin, CA 92780
(866) 888-6653 www.eurofinsus.com/Built

Client: Terracon Consultants, Inc.-Oakland
C/O: Ms. Karin Schroeter
Re: R1237170; Station #44-50 Stetson St, Moss Beach, CA

Date of Sampling: 03-22-2023
Date of Receipt: 03-23-2023
Date of Report: 03-28-2023

ASBESTOS PLM REPORT

Location: 01C, 12" Tan VFT-3 Layers and Yellow and Black Mastics; Open Area NE Corner

Lab ID-Version‡: 15525271-1

Sample Layers	Asbestos Content
Off-White Floor Tile	ND
Yellow Mastic	ND
Blue Floor Tile	ND
Black Mastic	ND
Brown Floor Tile	3% Chrysotile
Sample Composite Homogeneity:	Poor

Location: 02A, White Sink Undercoating; Kitchen Sink

Lab ID-Version‡: 15525272-1

Sample Layers	Asbestos Content
White Sink Undercoating	ND
Sample Composite Homogeneity:	Good

Location: 02B, White Sink Undercoating; Kitchen Sink

Lab ID-Version‡: 15525273-1

Sample Layers	Asbestos Content
White Sink Undercoating	ND
Sample Composite Homogeneity:	Good

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Re: R1237170; Station #44-50 Stetson St, Moss Beach, CA

Date of Sampling: 03-22-2023
Date of Receipt: 03-23-2023
Date of Report: 03-28-2023

ASBESTOS PLM REPORT

Location: 03A, Yellow Carpet Mastic; Hallway West Side

Lab ID-Version‡: 15525274-1

Sample Layers	Asbestos Content
Yellow Carpet Mastic	ND
Sample Composite Homogeneity:	Good

Location: 03B, Yellow Carpet Mastic; Hallway East Side

Lab ID-Version‡: 15525275-1

Sample Layers	Asbestos Content
Yellow Carpet Mastic	ND
Sample Composite Homogeneity:	Good

Location: 03C, Yellow Carpet Mastic; Room #4

Lab ID-Version‡: 15525276-1

Sample Layers	Asbestos Content
Yellow Carpet Mastic	ND
Sample Composite Homogeneity:	Good

Location: 04A, Tan VSF Under Wood Flooring and White and Black Mastic; Restroom at Shower

Lab ID-Version‡: 15525277-1

Sample Layers	Asbestos Content
Tan Sheet Flooring with Fibrous Backing	ND
Black Mastic	3% Chrysotile
Composite Non-Asbestos Content:	20% Cellulose
Sample Composite Homogeneity:	Moderate

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Inhomogeneous samples are separated into homogeneous subsamples and analyzed individually. ND means no fibers were detected. When detected, the minimum detection and reporting limit is less than 1% unless point counting is performed. Floor tile samples may contain large amounts of interference material and it is recommended that the sample be analyzed by gravimetric point count analysis to lower the detection limit and to aid in asbestos identification.
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Client: Terracon Consultants, Inc.-Oakland
C/O: Ms. Karin Schroeter
Re: R1237170; Station #44-50 Stetson St, Moss Beach, CA

Date of Sampling: 03-22-2023
Date of Receipt: 03-23-2023
Date of Report: 03-28-2023

ASBESTOS PLM REPORT

Location: 04B, Tan VSF Under Wood Flooring and White and Black Mastic; Restroom at Shower

Lab ID-Version‡: 15525278-1

Sample Layers	Asbestos Content
Tan Sheet Flooring with Fibrous Backing	ND
Black Mastic	3% Chrysotile
Composite Non-Asbestos Content:	20% Cellulose
Sample Composite Homogeneity:	Moderate

Location: 05A, Textured Drywall and JC; Restroom at Shower

Lab ID-Version‡: 15525279-1

Sample Layers	Asbestos Content
White Joint Compound with Paint	ND
Off-White Joint Compound with Paint	2% Chrysotile
White Drywall with Brown Paper	ND
Composite Asbestos Fibrous Content:	< 1% Asbestos
Composite Non-Asbestos Content:	10% Cellulose
Sample Composite Homogeneity:	Moderate

Comments: Composite asbestos content provided is only for Drywall/Joint compound. Composite content provided for this analysis has been performed by following the NESHAP guidelines.

Location: 05B, Textured Drywall and JC; Hallway SW Corner

Lab ID-Version‡: 15525280-1

Sample Layers	Asbestos Content
White Joint Compound with Paint 1	ND
White Joint Compound with Paint 2	ND
White Drywall with Brown Paper	ND
Composite Non-Asbestos Content:	10% Cellulose
Sample Composite Homogeneity:	Moderate

Location: 05C, Textured Drywall and JC; Kitchen East Wall

Lab ID-Version‡: 15525281-1

Sample Layers	Asbestos Content
White Joint Compound with Paint	ND
Cream Tape	ND
Off-White Joint Compound with Paint	2% Chrysotile
White Drywall with Brown Paper	ND
Composite Asbestos Fibrous Content:	< 1% Asbestos
Composite Non-Asbestos Content:	10% Cellulose
Sample Composite Homogeneity:	Moderate

Comments: Composite asbestos content provided is only for Drywall/Joint compound. Composite content provided for this analysis has been performed by following the NESHAP guidelines.

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Inhomogeneous samples are separated into homogeneous subsamples and analyzed individually. ND means no fibers were detected. When detected, the minimum detection and reporting limit is less than 1% unless point counting is performed. Floor tile samples may contain large amounts of interference material and it is recommended that the sample be analyzed by gravimetric point count analysis to lower the detection limit and to aid in asbestos identification.
‡ A "Version" indicated by -"x" after the Lab ID# with a value greater than 1 indicates a sample with amended data. The revision number is reflected by the value of "x".

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C/O: Ms. Karin Schroeter
Re: R1237170; Station #44-50 Stetson St, Moss Beach, CA

Date of Sampling: 03-22-2023
Date of Receipt: 03-23-2023
Date of Report: 03-28-2023

ASBESTOS PLM REPORT

Location: 05D, Textured Drywall and JC; Open Area South Wall

Lab ID-Version‡: 15525282-1

Sample Layers	Asbestos Content
White Joint Compound with Paint	ND
White Drywall with Brown Paper	ND
Composite Non-Asbestos Content:	10% Cellulose
Sample Composite Homogeneity:	Moderate

Location: 05E, Textured Drywall and JC; Room #1 NW Side

Lab ID-Version‡: 15525283-1

Sample Layers	Asbestos Content
Cream Tape with Paint	ND
White Joint Compound	ND
White Drywall with Brown Paper	ND
Composite Non-Asbestos Content:	10% Cellulose
Sample Composite Homogeneity:	Moderate

Location: 06A, Texture for Drywall; Restroom at Shower

Lab ID-Version‡: 15525284-1

Sample Layers	Asbestos Content
Off-White Texture	2% Chrysotile
Sample Composite Homogeneity:	Good

Location: 06B, Texture for Drywall; Hallway SW Corner

Lab ID-Version‡: 15525285-1

Sample Layers	Asbestos Content
White Texture	ND
Sample Composite Homogeneity:	Good

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Inhomogeneous samples are separated into homogeneous subsamples and analyzed individually. ND means no fibers were detected. When detected, the minimum detection and reporting limit is less than 1% unless point counting is performed. Floor tile samples may contain large amounts of interference material and it is recommended that the sample be analyzed by gravimetric point count analysis to lower the detection limit and to aid in asbestos identification.
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Client: Terracon Consultants, Inc.-Oakland
C/O: Ms. Karin Schroeter
Re: R1237170; Station #44-50 Stetson St, Moss Beach, CA

Date of Sampling: 03-22-2023
Date of Receipt: 03-23-2023
Date of Report: 03-28-2023

ASBESTOS PLM REPORT

Location: 06C, Texture for Drywall; Kitchen East Wall

Lab ID-Version‡: 15525286-1

Sample Layers	Asbestos Content
White Texture	ND
Sample Composite Homogeneity:	Good

Location: 06D, Texture for Drywall; Open Area South Wall

Lab ID-Version‡: 15525287-1

Sample Layers	Asbestos Content
White Texture	ND
Sample Composite Homogeneity:	Good

Location: 06E, Texture for Drywall; Room #1 NW Side

Lab ID-Version‡: 15525288-1

Sample Layers	Asbestos Content
Brown Paper with Paint	ND
Composite Non-Asbestos Content:	10% Cellulose
Sample Composite Homogeneity:	Good

Comments: Texture not detected.

Location: 06F, Texture for Drywall; Open Area West Wall

Lab ID-Version‡: 15525289-1

Sample Layers	Asbestos Content
White Texture	ND
Off-White Texture	2% Chrysotile
Sample Composite Homogeneity:	Good

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C/O: Ms. Karin Schroeter
Re: R1237170; Station #44-50 Stetson St, Moss Beach, CA

Date of Sampling: 03-22-2023
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Date of Report: 03-28-2023

ASBESTOS PLM REPORT

Location: 06G, Texture for Drywall; Open Area North Wall

Lab ID-Version‡: 15525290-1

Sample Layers	Asbestos Content
White Texture	ND
Cream Texture	ND
Sample Composite Homogeneity:	Good

Location: 07A, 12" Brown VFT Under Carpet and Black and Yellow Mastics; Room #2 NW

Lab ID-Version‡: 15525291-1

Sample Layers	Asbestos Content
Brown Floor Tile	3% Chrysotile
Black Mastic	3% Chrysotile
Sample Composite Homogeneity:	Moderate

Location: 07B, 12" Brown VFT Under Carpet and Black and Yellow Mastics; Room #2 NE

Lab ID-Version‡: 15525292-1

Sample Layers	Asbestos Content
Brown Floor Tile	3% Chrysotile
Black Mastic	3% Chrysotile
Sample Composite Homogeneity:	Moderate

Location: 07C, 12" Brown VFT Under Carpet and Black and Yellow Mastics; Room #1 NW

Lab ID-Version‡: 15525293-1

Sample Layers	Asbestos Content
Brown Floor Tile	3% Chrysotile
Black Mastic	3% Chrysotile
Sample Composite Homogeneity:	Moderate

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ASBESTOS PLM REPORT

Location: 08A, Brown FRP Mastic; App Bay North Wall

Lab ID-Version‡: 15525294-1

Sample Layers	Asbestos Content
Brown Mastic	ND
Sample Composite Homogeneity:	Good

Location: 08B, Brown FRP Mastic; App Bay North Wall

Lab ID-Version‡: 15525295-1

Sample Layers	Asbestos Content
Brown Mastic	ND
Sample Composite Homogeneity:	Good

Location: 08C, Brown FRP Mastic; App Bay North Wall

Lab ID-Version‡: 15525296-1

Sample Layers	Asbestos Content
Brown Mastic	ND
Sample Composite Homogeneity:	Good

Location: 09A, Drywall and JC; App Bay South

Lab ID-Version‡: 15525297-1

Sample Layers	Asbestos Content
White Joint Compound with Paint	ND
White Drywall with Brown Paper	ND
Composite Non-Asbestos Content:	10% Cellulose
Sample Composite Homogeneity:	Moderate

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ASBESTOS PLM REPORT

Location: 09B, Drywall and JC; App Bay Restroom SW

Lab ID-Version‡: 15525298-1

Sample Layers	Asbestos Content
White Joint Compound with Paint	ND
White Drywall with Brown Paper	ND
Composite Non-Asbestos Content:	10% Cellulose
Sample Composite Homogeneity:	Moderate

Location: 09C, Drywall and JC; App Bay North

Lab ID-Version‡: 15525299-1

Sample Layers	Asbestos Content
White Joint Compound with Paint	2% Chrysotile
White Drywall with Brown Paper	ND
Composite Asbestos Fibrous Content:	< 1% Asbestos
Composite Non-Asbestos Content:	10% Cellulose
Sample Composite Homogeneity:	Moderate

Comments: Composite asbestos content provided is only for Drywall/Joint compound. Composite content provided for this analysis has been performed by following the NESHAP guidelines.

Location: 10A, Texture for Drywall; App Bay South

Lab ID-Version‡: 15525300-1

Sample Layers	Asbestos Content
White Texture	ND
Sample Composite Homogeneity:	Good

Location: 10B, Texture for Drywall; App Bay Restroom SW

Lab ID-Version‡: 15525301-1

Sample Layers	Asbestos Content
White Texture	ND
Sample Composite Homogeneity:	Good

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ASBESTOS PLM REPORT

Location: 10C, Texture for Drywall; App Bay North

Lab ID-Version‡: 15525302-1

Sample Layers	Asbestos Content
Off-White Texture	2% Chrysotile
Sample Composite Homogeneity:	Good

Location: 10D, Texture for Drywall; App Bay SE

Lab ID-Version‡: 15525303-1

Sample Layers	Asbestos Content
White Texture	ND
Sample Composite Homogeneity:	Good

Location: 10E, Texture for Drywall; App Bay East

Lab ID-Version‡: 15525304-1

Sample Layers	Asbestos Content
White Texture	ND
Off-White Texture	2% Chrysotile
Sample Composite Homogeneity:	Good

Location: 11A, 9" Tan/Brown VFT and Black Mastic; App Bay Restroom

Lab ID-Version‡: 15525305-1

Sample Layers	Asbestos Content
Brown/Beige Floor Tile	3% Chrysotile
Black Mastic	3% Chrysotile
Sample Composite Homogeneity:	Moderate

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ASBESTOS PLM REPORT

Location: 11B, 9" Tan/Brown VFT and Black Mastic; App Bay Restroom

Lab ID-Version‡: 15525306-1

Sample Layers	Asbestos Content
Brown/Beige Floor Tile	3% Chrysotile
Black Mastic	3% Chrysotile
Sample Composite Homogeneity:	Moderate

Location: 11C, 9" Tan/Brown VFT and Black Mastic; App Bay Restroom

Lab ID-Version‡: 15525307-1

Sample Layers	Asbestos Content
Brown/Beige Floor Tile	3% Chrysotile
Black Mastic	ND
Sample Composite Homogeneity:	Moderate

Location: 12A, Concrete Slab; App Bay East

Lab ID-Version‡: 15525308-1

Sample Layers	Asbestos Content
Red Concrete	ND
Gray Concrete	ND
Sample Composite Homogeneity:	Moderate

Location: 12B, Concrete Slab; App Bay Center

Lab ID-Version‡: 15525309-1

Sample Layers	Asbestos Content
Red Concrete	ND
Gray Concrete	ND
Sample Composite Homogeneity:	Moderate

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ASBESTOS PLM REPORT

Location: 12C, Concrete Slab; App Bay West

Lab ID-Version‡: 15525310-1

Sample Layers	Asbestos Content
Red Concrete	ND
Gray Concrete	ND
Sample Composite Homogeneity:	Moderate

Location: 13A, Stucco and Texture; West Side of App Bay

Lab ID-Version‡: 15525311-1

Sample Layers	Asbestos Content
White Skim Coat	ND
Brown Texture	ND
Gray Stucco	< 1% Chrysotile
Sample Composite Homogeneity:	Moderate

Location: 13B, Stucco and Texture; NW Side of App Bay

Lab ID-Version‡: 15525312-1

Sample Layers	Asbestos Content
White Skim Coat	ND
Gray Stucco	< 1% Chrysotile
Sample Composite Homogeneity:	Moderate

Comments: Texture not detected.

Location: 13C, Stucco and Texture; East Side of App Bay

Lab ID-Version‡: 15525313-1

Sample Layers	Asbestos Content
Brown Texture	ND
Gray Stucco	ND
Sample Composite Homogeneity:	Moderate

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ASBESTOS PLM REPORT

Location: 13D, Stucco and Texture; SE Side of Building

Lab ID-Version‡: 15525314-1

Sample Layers	Asbestos Content
White Skim Coat	ND
Gray Stucco	ND
Sample Composite Homogeneity:	Moderate

Comments: Texture not detected.

Location: 13E, Stucco and Texture; SW Side of Building

Lab ID-Version‡: 15525315-1

Sample Layers	Asbestos Content
Brown Texture	ND
Gray Stucco	ND
Sample Composite Homogeneity:	Moderate

Location: 14A, White Wood Panel/Trim Sealant-Exterior; SE Side of Building at Wood Panel to Stucco

Lab ID-Version‡: 15525316-1

Sample Layers	Asbestos Content
White Sealant	ND
Sample Composite Homogeneity:	Good

Location: 14B, White Wood Panel/Trim Sealant-Exterior; SE Side of Building at Wood Panel to Stucco

Lab ID-Version‡: 15525317-1

Sample Layers	Asbestos Content
White Sealant	ND
Sample Composite Homogeneity:	Good

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ASBESTOS PLM REPORT

Location: 14C, White Wood Panel/Trim Sealant-Exterior; West Side at Entry Wood Overhang to Stucco

Lab ID-Version‡: 15525318-1

Sample Layers	Asbestos Content
Tan Sealant	2% Chrysotile
Sample Composite Homogeneity:	Good

Location: 15A, Black Window Sealant-Frame to Wood Trim; Glass Windows at Entry

Lab ID-Version‡: 15525319-1

Sample Layers	Asbestos Content
Black Sealant	ND
Sample Composite Homogeneity:	Good

Location: 15B, Black Window Sealant-Frame to Wood Trim; Glass Windows at Entry

Lab ID-Version‡: 15525320-1

Sample Layers	Asbestos Content
Black Sealant	ND
Sample Composite Homogeneity:	Good

Location: 15C, Black Window Sealant-Frame to Wood Trim; Glass Windows at Entry

Lab ID-Version‡: 15525321-1

Sample Layers	Asbestos Content
Black Sealant	ND
Sample Composite Homogeneity:	Good

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ASBESTOS PLM REPORT

Location: 16A, Concrete Sidewalk/Driveway-New; Driveway at App Building

Lab ID-Version‡: 15525322-1

Sample Layers	Asbestos Content
Gray Concrete	ND
Sample Composite Homogeneity:	Good

Location: 16B, Concrete Sidewalk/Driveway-New; Sidewalk at SW App Bld

Lab ID-Version‡: 15525323-1

Sample Layers	Asbestos Content
Gray Concrete	ND
Sample Composite Homogeneity:	Good

Location: 17A, Concrete Sidewalk-Old; At Building Entry

Lab ID-Version‡: 15525324-1

Sample Layers	Asbestos Content
Gray Concrete	ND
Sample Composite Homogeneity:	Good

Location: 17B, Concrete Sidewalk-Old; At Building Entry

Lab ID-Version‡: 15525325-1

Sample Layers	Asbestos Content
Gray Concrete	ND
Sample Composite Homogeneity:	Good

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ASBESTOS PLM REPORT

Location: 18A, Asphalt; SW Side

Lab ID-Version‡: 15525326-1

Sample Layers	Asbestos Content
Black Asphalt	ND
Sample Composite Homogeneity:	Good

Location: 18B, Asphalt; SE Side

Lab ID-Version‡: 15525327-1

Sample Layers	Asbestos Content
Black Asphalt	ND
Sample Composite Homogeneity:	Good

Location: 18C, Asphalt; NE Side

Lab ID-Version‡: 15525328-1

Sample Layers	Asbestos Content
Black Asphalt	ND
Sample Composite Homogeneity:	Good

Location: 19A, CMU Grout on Retaining Wall-Concrete Filled; South Side

Lab ID-Version‡: 15525329-1

Sample Layers	Asbestos Content
Gray Grout	ND
Sample Composite Homogeneity:	Good

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ASBESTOS PLM REPORT

Location: 19B, CMU Grout on Retaining Wall-Concrete Filled; East Side

Lab ID-Version‡: 15525330-1

Sample Layers	Asbestos Content
Gray Grout	ND
Sample Composite Homogeneity:	Good

Location: 19C, CMU Grout on Retaining Wall-Concrete Filled; NE Side

Lab ID-Version‡: 15525331-1

Sample Layers	Asbestos Content
Gray Grout	ND
Sample Composite Homogeneity:	Good

Location: 20A, Drywall and JC; Generator Shed SW

Lab ID-Version‡: 15525332-1

Sample Layers	Asbestos Content
White Joint Compound with Paint	ND
Cream Tape	ND
White Joint Compound	ND
White Drywall	ND
Composite Non-Asbestos Content:	10% Cellulose
Sample Composite Homogeneity:	Moderate

Location: 20B, Drywall and JC; Generator Shed SE

Lab ID-Version‡: 15525333-1

Sample Layers	Asbestos Content
White Joint Compound with Paint	ND
Cream Tape	ND
White Joint Compound	ND
White Drywall	ND
Composite Non-Asbestos Content:	10% Cellulose
Sample Composite Homogeneity:	Moderate

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ASBESTOS PLM REPORT

Location: 20C, Drywall and JC; Compressor Shed SE

Lab ID-Version‡: 15525334-1

Sample Layers	Asbestos Content
Cream Tape with Paint	ND
White Joint Compound	ND
White Drywall with Brown Paper	ND
Composite Non-Asbestos Content:	10% Cellulose
Sample Composite Homogeneity:	Moderate

Location: 21A, Roofing Shingle and Paper Barrier; Generator Shed

Lab ID-Version‡: 15525335-1

Sample Layers	Asbestos Content
Black Roofing Shingle with Pebbles 1	ND
Black Roofing Shingle with Pebbles 2	ND
Black Vapor Barrier	ND
Composite Non-Asbestos Content:	40% Glass Fibers 35% Cellulose
Sample Composite Homogeneity:	Moderate

Location: 21B, Roofing Shingle and Paper Barrier; Generator Shed

Lab ID-Version‡: 15525336-1

Sample Layers	Asbestos Content
Black Roofing Shingle with Pebbles	ND
Black Vapor Barrier	ND
Composite Non-Asbestos Content:	40% Glass Fibers 35% Cellulose
Sample Composite Homogeneity:	Moderate

Location: 22A, Roll on Asphaltic Roofing and Paper Barrier; Compressor Shed

Lab ID-Version‡: 15525337-1

Sample Layers	Asbestos Content
Black Asphalt	ND
Black Vapor Barrier	ND
Composite Non-Asbestos Content:	40% Glass Fibers 35% Cellulose
Sample Composite Homogeneity:	Moderate

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ASBESTOS PLM REPORT

Location: 22B, Roll on Asphaltic Roofing and Paper Barrier; Compressor Shed

Lab ID-Version‡: 15525338-1

Sample Layers	Asbestos Content
Black Asphalt	ND
Black Vapor Barrier 1	ND
Black Vapor Barrier 2	ND
Composite Non-Asbestos Content:	40% Glass Fibers 35% Cellulose
Sample Composite Homogeneity:	Moderate

Location: 23A, Grey Roof Patch; Compressor Shed

Lab ID-Version‡: 15525339-1

Sample Layers	Asbestos Content
Gray Mastic	5% Chrysotile
Sample Composite Homogeneity:	Good

Location: 23B, Grey Roof Patch; Compressor Shed

Lab ID-Version‡: 15525340-1

Sample Layers	Asbestos Content
Gray Mastic	5% Chrysotile
Sample Composite Homogeneity:	Good

Location: 24A, Brown Mastic on 4" Brown Covebase; App Bay Restroom

Lab ID-Version‡: 15525341-1

Sample Layers	Asbestos Content
Brown Baseboard	ND
Brown Mastic	ND
Sample Composite Homogeneity:	Moderate

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‡ A "Version" indicated by -"x" after the Lab ID# with a value greater than 1 indicates a sample with amended data. The revision number is reflected by the value of "x".

Eurofins EPK Built Environment Testing, LLC
2841 Dow Avenue, Suite 300, Tustin, CA 92780
(866) 888-6653 www.eurofinsus.com/Built

Client: Terracon Consultants, Inc.-Oakland
C/O: Ms. Karin Schroeter
Re: R1237170; Station #44-50 Stetson St, Moss Beach, CA

Date of Sampling: 03-22-2023
Date of Receipt: 03-23-2023
Date of Report: 03-28-2023

ASBESTOS PLM REPORT

Location: 24B, Brown Mastic on 4" Brown Covebase; App Bay Restroom

Lab ID-Version‡: 15525342-1

Sample Layers	Asbestos Content
Brown Baseboard	ND
Brown Mastic	ND
Sample Composite Homogeneity:	Moderate

Location: 25A, Asphalt Roll On Roofing-Field; West Lower Roof

Lab ID-Version‡: 15525343-1

Sample Layers	Asbestos Content
Black Asphalt 1	ND
Black Asphalt 2	ND
Brown Roofing Material	ND
Composite Non-Asbestos Content:	45% Cellulose 35% Glass Fibers
Sample Composite Homogeneity:	Good

Location: 25B, Asphalt Roll On Roofing-Field; East Lower Roof

Lab ID-Version‡: 15525344-1

Sample Layers	Asbestos Content
Black Asphalt 1	ND
Black Asphalt 2	ND
Black Asphalt 3	ND
Brown Roofing Material	ND
Composite Non-Asbestos Content:	45% Cellulose 35% Glass Fibers
Sample Composite Homogeneity:	Good

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Date of Sampling: 03-22-2023
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Date of Report: 03-28-2023

ASBESTOS PLM REPORT

Location: 25C, Asphalt Roll On Roofing-Field; West Upper Roof

Lab ID-Version‡: 15525345-1

Sample Layers	Asbestos Content
Black Asphalt 1	ND
Black Asphalt 2	ND
Black Asphalt 3	ND
Black Asphalt 4	ND
Black Asphalt 5	ND
Composite Non-Asbestos Content:	45% Cellulose 35% Glass Fibers
Sample Composite Homogeneity:	Good

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ASBESTOS PLM REPORT

Location: 25D, Asphalt Roll On Roofing-Field; South Upper Roof

Lab ID-Version‡: 15525346-1

Sample Layers	Asbestos Content
Black Asphalt 1	ND
Black Asphalt 2	ND
Black Asphalt 3	ND
Black Asphalt 4	ND
Composite Non-Asbestos Content:	45% Cellulose 35% Glass Fibers
Sample Composite Homogeneity:	Good

Location: 25E, Asphalt Roll On Roofing-Field; North Upper Roof

Lab ID-Version‡: 15525347-1

Sample Layers	Asbestos Content
Black Asphalt 1	ND
Black Asphalt 2	ND
Black Asphalt 3	ND
Composite Non-Asbestos Content:	45% Cellulose 35% Glass Fibers
Sample Composite Homogeneity:	Good

Location: 26A, Penetration Mastic; Upper Roof East

Lab ID-Version‡: 15525348-1

Sample Layers	Asbestos Content
Black Roofing Mastic	ND
Composite Non-Asbestos Content:	5% Cellulose
Sample Composite Homogeneity:	Good

Location: 26B, Penetration Mastic; Upper Roof Center

Lab ID-Version‡: 15525349-1

Sample Layers	Asbestos Content
Black Roofing Mastic	ND
Composite Non-Asbestos Content:	5% Cellulose
Sample Composite Homogeneity:	Good

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Date of Sampling: 03-22-2023
Date of Receipt: 03-23-2023
Date of Report: 03-28-2023

ASBESTOS PLM REPORT

Location: 26C, Penetration Mastic; Lower Roof South

Lab ID-Version‡: 15525350-1

Sample Layers	Asbestos Content
Black Roofing Mastic	ND
Composite Non-Asbestos Content:	5% Cellulose
Sample Composite Homogeneity:	Good

Location: 27A, Skylight Curb Mastic; Upper Roof East

Lab ID-Version‡: 15525351-1

Sample Layers	Asbestos Content
Black Mastic	ND
Composite Non-Asbestos Content:	3% Cellulose
Sample Composite Homogeneity:	Good

Location: 27B, Skylight Curb Mastic; Upper Roof Center

Lab ID-Version‡: 15525352-1

Sample Layers	Asbestos Content
Black Mastic	ND
Composite Non-Asbestos Content:	3% Cellulose
Sample Composite Homogeneity:	Good

Location: 27C, Skylight Curb Mastic; Lower Roof South

Lab ID-Version‡: 15546966-1

Sample Layers	Asbestos Content
Black Mastic	ND
Composite Non-Asbestos Content:	3% Cellulose
Sample Composite Homogeneity:	Good

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Terracon

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ACM BULK SAMPLE DATA SHEET

☑ PLM Analysis (Analyze all samples)
☐ Stop Analysis at First Positive
☐ Point Count Analysis (400-point)

Project Name/ Address/ Building No. Station #44-501 Stetson St, Moss Beach CA

Project# R1237170 Sampled By: SR/DM Sampling Date: 3/22/23

Sample(s) sent to: ☐ MAL ☐ ASB TEM ☑ EMLAB ☐ Other

TAT ☐ Rush ☐ 24HRS ☐ 48HR ☑ 3-5 days

HM# 01	Material Description 12" Tan VFT - 3 layers + yellow & Black mastics	
Sample ID	Sample Location & Material Location	Quantity:
01A	Kitchen East side	800 □'
01B	open area at west entry	
01C	open area NE corner	

HM# 02	Material Description: White sink undercoating	
Sample ID	Sample Location & Material Location	Quantity:
02A	Kitchen sink	4 □'
02B	" "	

HM# 03	Material Description: yellow carpet mastic	
Sample ID	Sample Location & Material Location	Quantity:
03A	Hallway west side	400 □'
03B	Hallway East side	
03C	Room #4	

HM# 04	Material Description: Tan VFT under wood flooring + white & Black mastic	
Sample ID	Sample Location & Material Location	Quantity:
04A	Restroom at shower	120 □'
04B	" "	

HM# 05	Material Description: Textured drywall + S/C	
Sample ID	Sample Location & Material Location	Quantity:
05A	Restroom at Shower	6,000 □'
05B	Hallway SW corner	
05C	Kitchen East wall	

Relinquished By:	Steve Rogers	Signature:	Date/Time:	3/22/23
Received By:	Johnfang	Signature:	Date/ Time:	3/23/23 9:46 am
Relinquished By:		Signature:	Date/Time:	
Received By:		Signature:	Date/Time:	

Terracon

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ACM BULK SAMPLE DATA SHEET

☑ PLM Analysis (Analyze all samples)
☐ Stop Analysis at First Positive
☐ Point Count Analysis (400-point)

Project Name/ Address/ Building No. Station #44-501 Stetson St, Moss Beach CA

Project# R1237170 Sampled By: SR/DM Sampling Date: 3/22/23

Sample(s) sent to: ☐ MAL ☐ ASB TEM ☑ EMLAB ☐ Other

TAT ☐ Rush ☐ 24HRS ☐ 48HR ☑ 3-5 days

HM# 05	Material Description Textured drywall + J/C	
Sample ID	Sample Location & Material Location	Quantity:
05D	open area South wall	6000 ☒
05E	Room #1 NW side	

HM# 06	Material Description: Texture for drywall	
Sample ID	Sample Location & Material Location	Quantity:
06A	Restroom at Shower	6000 ☒
06B	Hallway SW corner	
06C	Kitchen East wall	

HM# 06	Material Description: " "	
Sample ID	Sample Location & Material Location	Quantity:
06D	open area South wall	
06E	Room #1 NW side	
06F	open area west wall	

HM# 06	Material Description: " "	
Sample ID	Sample Location & Material Location	Quantity:
06G	open area North wall	

HM# 07	Material Description: 12" Brown VFT under carpet + Black & yellow mastics	
Sample ID	Sample Location & Material Location	Quantity:
07A	Room #2 NW	300 ☒
07B	Room #2 NE	
07C	Room #1 NW	

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Received By:	John Pang	Signature:		Date/ Time:	3/23/23 9:46 am
Relinquished By:		Signature:		Date/Time:	
Received By:		Signature:		Date/Time:	

1466 66th Street Emeryville CA 94608 Tel: (510) 547-7771 Fax: (510) 547-1983

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ACM BULK SAMPLE DATA SHEET

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☐ Point Count Analysis (400-point)

Project Name/ Address/ Building No. Station #44-501 Stetson St, Moss Beach CA

Project# R1237170 Sampled By: SR/DM Sampling Date: 3/22/23

Sample(s) sent to: ☐ MAL ☐ ASB TEM ☑ EMLAB ☐ Other

TAT ☐ Rush ☐ 24HRS ☐ 48HR ☑ 3-5 days

HM# 08	Material Description Brown FRP Mastic	
Sample ID	Sample Location & Material Location	Quantity:
08A	App Bay North wall	200 ☒
08B	" "	
08C	" "	

HM# 09	Material Description: Drywall + S/C	
Sample ID	Sample Location & Material Location	Quantity:
09A	App Bay South	2000 ☒
09B	App Bay restroom SW	
09C	App Bay North	

HM# 10	Material Description: Texture for drywall	
Sample ID	Sample Location & Material Location	Quantity:
10A	App Bay South	1800 ☒
10B	App Bay restroom SW	
10C	App Bay North	

HM# 10	Material Description: " "	
Sample ID	Sample Location & Material Location	Quantity:
10D	App Bay SE	
10E	App Bay East	

HM# 11	Material Description: 9" Tan/Brown VFT + Black mastic	
Sample ID	Sample Location & Material Location	Quantity:
11A	App Bay Restroom	135 ☒
11B	" "	
11C	" "	

Relinquished By:	Steve Pegus	Signature:	[signature]	Date/Time:	3/22/23
Received By:	Johnny	Signature:	[signature]	Date/ Time:	3/23/23 9:45 am
Relinquished By:		Signature:		Date/Time:	
Received By:		Signature:		Date/Time:	

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☐ Stop Analysis at First Positive
☐ Point Count Analysis (400-point)

Project Name/ Address/ Building No: Station #44-501 Stetson St, Moss Beach CA

Project# R1237170 Sampled By: SR/DM Sampling Date: 3/22/23

Sample(s) sent to: ☐ MAL ☐ ASB TEM ☑ EMLAB ☐ Other

TAT ☐ Rush ☐ 24HRS ☐ 48HR ☑ 3-5 days

HM# 12	Material Description: Concrete Slab	
Sample ID	Sample Location & Material Location	Quantity:
12A	App Bay East	4,000 ☑
12B	App Bay Center	
12C	App Bay west	
HM# 13	Material Description: Stucco + Texture	
Sample ID	Sample Location & Material Location	Quantity:
13A	west side of App Bay	4800 ☑
13B	NW side of App Bay	
13C	East side of Building	
HM# 13	Material Description:	
Sample ID	Sample Location & Material Location	Quantity:
13D	SE side of Building	
13E	SW side of Building	
HM# 14	Material Description: White wood panel/Trim sealant - Exterior	
Sample ID	Sample Location & Material Location	Quantity:
14A	SE side of Building at wood panel to stucco	80 ☑
14B	SE side of Building at wood panel to stucco	
14C	west side of Building at entry wood overhang to stucco	
HM# 15	Material Description: Black window sealant - Frame to wood trim	
Sample ID	Sample Location & Material Location	Quantity:
15A	Glass windows at entry	10 ☑
15B	" "	
15C	" "	

Relinquished By:	Steve Rogers	Signature:	[signature]	Date/Time:	3/22/23
Received By:	John Fang	Signature:	[signature]	Date/ Time:	3/22 9:45
Relinquished By:		Signature:		Date/Time:	
Received By:		Signature:		Date/Time:	

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ACM BULK SAMPLE DATA SHEET

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Project Name/ Address/ Building No: Station #44-501 Stetson St, Moss Beach CA

Project#: R1237170 Sampled By: SR/DM Sampling Date: 3/22/23

Sample(s) sent to: ☐ MAL ☐ ASB TEM ☑ EMLAB ☐ Other

TAT ☐ Rush ☐ 24HRS ☐ 48HR ☑ 3-5 days

HM# 16	Material Description: Concrete sidewalk/driveway - New	Quantity:
Sample ID	Sample Location & Material Location	
16A	Driveway at App Building	
16B	Sidewalk at SW App Bld	

HM# 17	Material Description: Concrete sidewalk - old	Quantity:
Sample ID	Sample Location & Material Location	
17A	at Building Entry	
17B	"	

HM# 18	Material Description: Asphalt	Quantity:
Sample ID	Sample Location & Material Location	
18A	SW side	
18B	SE side	
18C	NE side	

HM# 19	Material Description: CMU Grout on retaining wall - concrete filled	Quantity:
Sample ID	Sample Location & Material Location	
19A	South side	
19B	East side	
19C	NE side	

HM# 20	Material Description: Drywall T&C	Quantity:
Sample ID	Sample Location & Material Location	
20A	Generator shed SW	150 ft
20B	Generator shed SE	
20C	Compressor shed SE	

Relinquished By:	Steve Rosers	Signature:	[signature]	Date/Time:	3/22/23
Received By:	John Fang	Signature:	[signature]	Date/ Time:	3/23/23 9:46 am
Relinquished By:		Signature:		Date/Time:	
Received By:		Signature:		Date/Time:	

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Project Name/ Address/ Building No. Station #44-501 Stetson St, Moss Beach CA

Project# R1237170 Sampled By: JR/DM Sampling Date: 3/22/23

Sample(s) sent to: ☐ MAL ☐ ASB TEM ☑ EMLAB ☐ Other

TAT ☐ Rush ☐ 24HRS ☐ 48HR ☑ 3-5 days

HM# 21	Material Description Roofing Shingle + paper barrier	
Sample ID	Sample Location & Material Location	Quantity:
21A	Generator Shed	50 ☐
21B	" "	

HM# 22	Material Description: Roll on asphaltic roofing + paper barrier	
Sample ID	Sample Location & Material Location	Quantity:
22A	Compressor Shed	16 ☐
22B	" "	

HM# 23	Material Description: Grey roof patch	
Sample ID	Sample Location & Material Location	Quantity:
23A	Compressor Shed	5 ☐
23B	" "	

HM# 24	Material Description: Brown mastic on 4" Brown Coveebase	
Sample ID	Sample Location & Material Location	Quantity:
24A	App Bay restroom	10 ☐
24B	" "	

HM# 25	Material Description: Asphalt roll on roofing - Field	
Sample ID	Sample Location & Material Location	Quantity:
25A	west lower roof	4,000 ☐
25B	East lower roof	
25C	west upper roof	

Relinquished By:	Steve Rogers	Signature:	[signature]	Date/Time:	3/22/23
Received By:	Johnny	Signature:	[signature]	Date/ Time:	3/23/23 9:46 AM
Relinquished By:		Signature:		Date/Time:	
Received By:		Signature:		Date/Time:	

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ACM BULK SAMPLE DATA SHEET

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Project Name/ Address/ Building No. Station #44-501 Stetson St, Moss Beach CA

Project# R1237170 Sampled By: SR/DM Sampling Date: 3/22/23

Sample(s) sent to: ☐ MAL ☐ ASB TEM ☑ EMLAB ☐ Other

TAT ☐ Rush ☐ 24HRS ☐ 48HR ☑ 3-5 days

HM# 25	Material Description Asphalt roll on roofing - field	
Sample ID	Sample Location & Material Location	Quantity:
25D	South upper roof	
25E	North upper roof	

HM# 26	Material Description: Penetration mastic	
Sample ID	Sample Location & Material Location	Quantity:
26A	~~lower roof South~~ upper roof East	20 ☐
26B	upper roof Center	
26C	lower roof South	

HM# 27	Material Description: Skylight curb mastic	
Sample ID	Sample Location & Material Location	Quantity:
27A	upper roof East	36 ☐
27B	upper roof, Center	
27C	lower roof South	

HM# 28	Material Description: 4" yellow wall & floor tile	
Sample ID	Sample Location & Material Location	Quantity:
Assumed	Restroom Shower	100 ☐

HM#	Material Description:	
Sample ID	Sample Location & Material Location	Quantity:

Relinquished By: Steve Rogers Signature: [signature] Date/Time: 3/22/23
Received By: John Fung Signature: [signature] Date/ Time: 3/23/23 9:40 am
Relinquished By: Signature: Date/Time:
Received By: Signature: Date/Time:

003205514

Appendix 2:

Laboratory Results and Chain of Custody – Lead

eurofins | Built Environment Testing

Report for:

Ms. Karin Schroeter
Terracon Consultants, Inc.-Oakland
1220 Concord Avenue
Suite 450
Concord, CA 94520

Regarding: Eurofins EPK Built Environment Testing, LLC
Project: R1237170; Station #44 - 501 Stetson St, Moss Beach CA
EML ID: 3205542

Approved by:

Laboratory Manager
Danny Li

Dates of Analysis:
Lead - Flame AA: 03-30-2023

Service SOPs: Lead - Flame AA (EM-BC-S-8443)
AIHA-LAP, LLC accredited service, Lab ID #178697

All samples were received in acceptable condition unless noted in the Report Comments portion in the body of the report. Due to the nature of the analyses performed, field blank correction of results is not applied. The results relate only to the samples as received and tested. Sample size, as it relates to Wipe samples only, is supplied by the client.

Eurofins EPK Built Environment Testing, LLC ("the Company"), a member of the Eurofins Built Environment Testing group of companies, shall have no liability to the client or the client's customer with respect to decisions or recommendations made, actions taken or courses of conduct implemented by either the client or the client's customer as a result of or based upon the Test Results. In no event shall the Company be liable to the client with respect to the Test Results except for the Company's own willful misconduct or gross negligence nor shall the Company be liable for incidental or consequential damages or lost profits or revenues to the fullest extent such liability may be disclaimed by law, even if the Company has been advised of the possibility of such damages, lost profits or lost revenues. In no event shall the Company's liability with respect to the Test Results exceed the amount paid to the Company by the client therefor.
Eurofins EPK Built Environment Testing, LLC's LabServe® reporting system includes automated fail-safes to ensure that all AIHA-LAP, LLC quality requirements are met and notifications are added to reports when any quality steps remain pending.

Eurofins EPK Built Environment Testing, LLC
2841 Dow Avenue, Suite 300, Tustin, CA 92780
(866) 888-6653 www.eurofinsus.com/Built

Client: Terracon Consultants, Inc.-Oakland
C/O: Ms. Karin Schroeter
Re: R1237170; Station #44 - 501 Stetson St, Moss Beach CA

Date of Sampling: 03-22-2023
Date of Receipt: 03-23-2023
Date of Report: 03-30-2023

LEAD: FLAME ATOMIC ABSORPTION SPECTROMETRY

Location:	Pb-01: Yellow/Drywall/ Wall - Dayroom	Pb-02: Dark Tan/Drywall/ Wall - App Bay	Pb-03: Grey/Drywall/Wall - App Bay	Pb-04: Tan/Wood/Ceiling Beam - App Bay
Comments (see below)	None	None	None	None
Lab ID-Version‡:	15525747-1	15525748-1	15525749-1	15525750-1
Analysis Date:	03/30/2023	03/30/2023	03/30/2023	03/30/2023
Sample type	Paint Chip sample	Paint Chip sample	Paint Chip sample	Paint Chip sample
Method*	NIOSH 7082 & EPA 7000B modified	NIOSH 7082 & EPA 7000B modified	NIOSH 7082 & EPA 7000B modified	NIOSH 7082 & EPA 7000B modified
† Method Reporting Limit	39 ppm	39 ppm	39 ppm	39 ppm
Sample size	0.2556 grams	0.2535 grams	0.2551 grams	0.2567 grams
§Total Lead Result	< 39 ppm	< 39 ppm	< 39 ppm	2700 ppm

Comments:

Sample results have not been corrected for blank values.

Bulk samples are not covered under the AIHA-LAP, LLC service accreditation.

Wipe samples must meet ASTM E1792 criteria. Method Reporting Limits may not be valid for non-ASTM E1792 wipe samples.

*Sample preparation and analytical methods are based upon NIOSH 7082 and EPA 7000B.

† The Method Reporting Limit is the minimum concentration of Lead that the laboratory can confidently detect in the sample.

§ Total Lead Result has been rounded to two significant figures to reflect analytical precision.

‡ A "Version" indicated by -"x" after the Lab ID# with a value greater than 1 indicates a sample with amended data. The revision number is reflected by the value of "x".

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(866) 888-6653 www.eurofinsus.com/Built

Client: Terracon Consultants, Inc.-Oakland
C/O: Ms. Karin Schroeter
Re: R1237170; Station #44 - 501 Stetson St, Moss Beach CA

Date of Sampling: 03-22-2023
Date of Receipt: 03-23-2023
Date of Report: 03-30-2023

LEAD: FLAME ATOMIC ABSORPTION SPECTROMETRY

Location:	Pb-05: Green/Wood/Ext Trim	Pb-06: Tan/Stucco/Ext Wall - NE Side	Pb-07: Red/Metal/Roof Trim - Roof
Comments (see below)	None	None	None
Lab ID-Version‡:	15525751-1	15525752-1	15525753-1
Analysis Date:	03/30/2023	03/30/2023	03/30/2023
Sample type	Paint Chip sample	Paint Chip sample	Paint Chip sample
Method*	NIOSH 7082 & EPA 7000B modified	NIOSH 7082 & EPA 7000B modified	NIOSH 7082 & EPA 7000B modified
† Method Reporting Limit	40 ppm	40 ppm	39 ppm
Sample size	0.2498 grams	0.2507 grams	0.2540 grams
§Total Lead Result	< 40 ppm	< 40 ppm	< 39 ppm

Comments:

Sample results have not been corrected for blank values.

Bulk samples are not covered under the AIHA-LAP, LLC service accreditation.

Wipe samples must meet ASTM E1792 criteria. Method Reporting Limits may not be valid for non-ASTM E1792 wipe samples.

*Sample preparation and analytical methods are based upon NIOSH 7082 and EPA 7000B.

† The Method Reporting Limit is the minimum concentration of Lead that the laboratory can confidently detect in the sample.

§ Total Lead Result has been rounded to two significant figures to reflect analytical precision.

‡ A "Version" indicated by -"x" after the Lab ID# with a value greater than 1 indicates a sample with amended data. The revision number is reflected by the value of "x".

003205542

Terracon

E-MAIL REPORT TO: *PROJECT MANAGER (PM)*

☐ denise.wallen@terracon.com Engineering Assistant	☐ eric.dyer@terracon.com Engineering Assistant
☐ PM – S. Steiner spsteiner@terracon.com	☒ PM – K. Schroeter kmschroeter@terracon.com

☐ PM – K. Pilgrim kmpilgrim@terracon.com	☐ PM- M. Benefield msbenefield@terracon.com	☐ PM – W. Frieszell wmfrieszell@terracon.com	☐ PM – T. Kattchee takattchee@terracon.com	☐ PM – D. Block david.block@terracon.com

LEAD PAINT SAMPLE DATA SHEET

* Lead Analysis
☒ Flame AA (EPA 7420) ____ TTLC

PAGE 1 OF 2

Project Name/ Address/ Building No. Station #44-501 Stetson St, Moss Beach CA

Project# R1237170 Sampled By: SR/DM Sampling Date: 3/22/23

Sample(s) sent to: ☐ MAL ☐ EMSL ☐ Aerobiology ☐ Quantem Other EMLAB

TAT ☐ Rush ☐ 24HRS ☐ 48HRS ☒ 3-5 Day

Sample ID	Paint Description and Sample Location	Condition (I/F/P)
Pb-01	Paint Color: yellow Substrate: Drywall Component: wall Sample Location: Bldg # ____ Unit # ____ Room Dayroom	I
Pb-02	Paint Color: Dark tan Substrate: Drywall Component: wall Sample Location: Bldg # ____ Unit # ____ Room App Bay	I
Pb-03	Paint Color: Grey Substrate: Drywall Component: wall Sample Location: Bldg # ____ Unit # ____ Room App Bay	I
Pb-04	Paint Color: Tan Substrate: wood Component: Ceiling Beam Sample Location: Bldg # ____ Unit # ____ Room App Bay	I
Pb-05	Paint Color: Green Substrate: wood Component: Ext Trim Sample Location: Bldg # ____ Unit # ____ Room ____	I

Relinquished By: Stan Rogers / John Fang Signature: [signature] Date/Time: 3/22/23 3/23/23 9:4

Received By: ____ Signature: [signature] Date/ Time: ____

Received By: ____ Signature: ____ Date/Time: ____

1466 66th Street Emeryville CA 94608 Tel: (510) 547-7771 Fax: (510) 547-1983

Updated 02.23.2018

003205542

Terracon

E-MAIL REPORT TO: *PROJECT MANAGER (PM)			LEAD PAINT SAMPLE DATA SHEET	
☐ denise.wallen@terracon.com Engineering Assistant	☐ eric.dyen@terracon.com Engineering Assistant		* Lead Analysis ✓ Flame AA (EPA 7420) ____ TTLC	
☐ PM – S. Steiner spsteiner@terracon.com	☐ PM – K. Schroeter kmschroeter@terracon.com		PAGE 2 OF 2	
☐ PM – K. Pilgrim kmpilgrim@terracon.com	☐ PM- M. Benefield msbenefield@terracon.com	☐ PM – W. Frieszell wmfrieszell@terracon.com	☐ PM – T. Kattchee takattchee@terracon.com	☐ PM – D. Block david.block@terracon.com

Project Name/ Address/ Building No. Station #44-501 Stetson St, Moss Beach CA

Project# R1237170 Sampled By: SR/DM Sampling Date: 3/22/23

Sample(s) sent to: ☐ MAL ☐ EMSL ☐ Aerobiology ☐ Quantem Other EMLAB

TAT ☐ Rush ☐ 24HRS ☐ 48HRS ☑ 3-5 Day

Sample ID	Paint Description and Sample Location	Condition (I/F/P)
Pb-06	Paint Color: Tan Substrate: Stucco Component: Ext wall Sample Location: Bldg # NE side Unit # ____ Room ____	I
Pb-07	Paint Color: Red Substrate: metal Component: Roof Trim Sample Location: Bldg # Roof Unit # ____ Room ____	F
	Paint Color: ____ Substrate: ____ Component: ____ Sample Location: Bldg # ____ Unit # ____ Room ____	
	Paint Color: ____ Substrate: ____ Component: ____ Sample Location: Bldg # ____ Unit # ____ Room ____	
	Paint Color: ____ Substrate: ____ Component: ____ Sample Location: Bldg # ____ Unit # ____ Room ____	

Relinquished By: Steve Rosen Signature: [signature] Date/Time: 3/22/23

Received By: Johnny Signature: [signature] Date/ Time: 3/23/23 9:

Received By: ____ Signature: ____ Date/Time: ____

Appendix 3:

Laboratory Results and Chain of Custody - PCBs

McCampbell Analytical, Inc.

"When Quality Counts"

Analytical Report

WorkOrder:	2303G74
Report Created for:	Terracon 1220 Concord Avenue, Suite 450 Concord, CA 94520
Project Contact:	Karin Schroeter
Project P.O.:	
Project:	R1237170; Station #44-501 Stetson St., Moss Beach, CA
Project Received:	03/23/2023

Analytical Report reviewed & approved for release on 03/30/2023 by:

Yen Cao

Project Manager

The report shall not be reproduced except in full, without the written approval of the laboratory. The analytical results relate only to the items tested. Results reported conform to the most current NELAP standards, where applicable, unless otherwise stated in a case narrative.

1534 Willow Pass Rd. Pittsburg, CA 94565 ♦ TEL: (877) 252-9262 ♦ FAX: (925) 252-9269 ♦ www.mccampbell.com
CA ELAP 1644 ♦ NELAP 4033 ORELAP

McCampbell Analytical, Inc.
"When Quality Counts"

1534 Willow Pass Road, Pittsburg, CA 94565-1701
Toll Free Telephone: (877) 252-9262 / Fax: (925) 252-9269
http://www.mccampbell.com / E-mail: main@mccampbell.com

Glossary of Terms & Qualifier Definitions

Client: Terracon **WorkOrder:** 2303G74

Project: R1237170; Station #44-501 Stetson St., Moss Beach, CA

Glossary Abbreviation

%D	Serial Dilution Percent Difference
95% Interval	95% Confident Interval
CPT	Consumer Product Testing not NELAP Accredited
DF	Dilution Factor
DI WET	(DISTLC) Waste Extraction Test using DI water
DISS	Dissolved (direct analysis of 0.45 µm filtered and acidified water sample)
DLT	Dilution Test (Serial Dilution)
DUP	Duplicate
EDL	Estimated Detection Limit
ERS	External reference sample. Second source calibration verification.
ITEF	International Toxicity Equivalence Factor
LCS	Laboratory Control Sample
LQL	Lowest Quantitation Level
MB	Method Blank
MB % Rec	% Recovery of Surrogate in Method Blank, if applicable
MDL	Method Detection Limit [1]
ML	Minimum Level of Quantitation
MS	Matrix Spike
MSD	Matrix Spike Duplicate
NA	Not Applicable
ND	Not detected at or above the indicated MDL or RL
NR	Data Not Reported due to matrix interference or insufficient sample amount.
PDS	Post Digestion Spike
PDSD	Post Digestion Spike Duplicate
PF	Prep Factor
RD	Relative Difference
RL	Reporting limit [2]
RPD	Relative Percent Difference
RRT	Relative Retention Time
RSD	Relative Standard Deviation
SPK Val	Spike Value
SPKRef Val	Spike Reference Value
SPLP	Synthetic Precipitation Leachate Procedure
ST	Sorbent Tube
TCLP	Toxicity Characteristic Leachate Procedure

[1] MDL is the minimum measured concentration of a substance that can be reported with 99% confidence that the measured concentration is distinguishable from method blank results. Definition and Procedure for the Determination of the Method Detection Limit, Revision 2, 40CFR, Part 136, Appendix B, EPA 821-R-16-006, December 2016.

[2] RL is the lowest level that can be reliably determined within specified limits of precision and accuracy during routine laboratory operating conditions. (The RL cannot be lower than the lowest calibration standard used in the initial calibration of the instrument and must be greater than the MDL.)

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Toll Free Telephone: (877) 252-9262 / Fax: (925) 252-9269
http://www.mccampbell.com / E-mail: main@mccampbell.com

Glossary of Terms & Qualifier Definitions

Client: Terracon **WorkOrder:** 2303G74

Project: R1237170; Station #44-501 Stetson St., Moss Beach, CA

TEQ	Toxicity Equivalents
TZA	TimeZone Net Adjustment for sample collected outside of MAI's UTC.
WET (STLC)	Waste Extraction Test (Soluble Threshold Limit Concentration)

Analytical Qualifiers

S	Surrogate recovery outside accepted recovery limits.
a3	Sample diluted due to high organic content interfering with quantitative/or qualitative analysis.
c4	Surrogate recovery outside of the control limits due to coelution with another peak(s) / cluttered chromatogram.

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Analytical Report

Client:	Terracon	**WorkOrder:**	2303G74
Date Received:	03/23/2023 9:30	**Extraction Method:**	SW3550B/3630C
Date Prepared:	03/23/2023	**Analytical Method:**	SW8082
Project:	R1237170; Station #44-501 Stetson St., Moss Beach, CA	**Unit:**	mg/kg

Polychlorinated Biphenyls (PCBs) Aroclors w/ Column Style Clean-up

Client ID	Lab ID	Matrix	Date Collected	Instrument	Batch ID
PCB-01	**2303G74-001A**	**Caulk**	**03/22/2023**	**GC23 03282361.d**	**266207**

Analytes	Result	RL	DF	Date Analyzed
Aroclor1016	ND	10	20	03/29/2023 02:54
Aroclor1221	ND	10	20	03/29/2023 02:54
Aroclor1232	ND	10	20	03/29/2023 02:54
Aroclor1242	ND	10	20	03/29/2023 02:54
Aroclor1248	ND	10	20	03/29/2023 02:54
Aroclor1254	ND	10	20	03/29/2023 02:54
Aroclor1260	ND	10	20	03/29/2023 02:54
PCBs, total	ND	10	20	03/29/2023 02:54

Surrogates	REC (%)	Limits	
Decachlorobiphenyl	122	70-130	03/29/2023 02:54

Analyst(s): CN Analytical Comments: a3

Client ID	Lab ID	Matrix	Date Collected	Instrument	Batch ID
PCB-02	**2303G74-002A**	**Caulk**	**03/22/2023**	**GC23 03282331.d**	**266207**

Analytes	Result	RL	DF	Date Analyzed
Aroclor1016	ND	10	20	03/28/2023 19:09
Aroclor1221	ND	10	20	03/28/2023 19:09
Aroclor1232	ND	10	20	03/28/2023 19:09
Aroclor1242	ND	10	20	03/28/2023 19:09
Aroclor1248	ND	10	20	03/28/2023 19:09
Aroclor1254	ND	10	20	03/28/2023 19:09
Aroclor1260	ND	10	20	03/28/2023 19:09
PCBs, total	ND	10	20	03/28/2023 19:09

Surrogates	REC (%)	Qualifiers	Limits	
Decachlorobiphenyl	172	S	70-130	03/28/2023 19:09

Analyst(s): CN Analytical Comments: a3,c4

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Quality Control Report

Client:	Terracon	**WorkOrder:**	2303G74
Date Prepared:	03/23/2023	**BatchID:**	266207
Date Analyzed:	03/28/2023	**Extraction Method:**	SW3550B/3630C
Instrument:	GC23	**Analytical Method:**	SW8082
Matrix:	Caulk	**Unit:**	mg/kg
Project:	R1237170; Station #44-501 Stetson St., Moss Beach, CA	**Sample ID:**	MB/LCS/LCSD-266207

QC Summary Report for SW8082 w/ Column Clean-up

Analyte	MB Result	MDL	RL	SPK Val	MB SS %REC	MB SS Limits
Aroclor1016	ND	0.050	0.050	-	-	-
Aroclor1221	ND	0.050	0.050	-	-	-
Aroclor1232	ND	0.050	0.050	-	-	-
Aroclor1242	ND	0.050	0.050	-	-	-
Aroclor1248	ND	0.050	0.050	-	-	-
Aroclor1254	ND	0.050	0.050	-	-	-
Aroclor1260	ND	0.050	0.050	-	-	-
Surrogate Recovery						
Decachlorobiphenyl	0.050			0.05	99	70-130

Analyte	LCS Result	LCSD Result	SPK Val	LCS %REC	LCSD %REC	LCS/LCSD Limits	RPD	RPD Limit
Aroclor1016	0.16	0.16	0.15	107	107	70-130	0.0493	20
Aroclor1260	0.19	0.18	0.15	124	123	70-130	1.06	20
Surrogate Recovery								
Decachlorobiphenyl	0.048	0.049	0.050	97	98	70-130	1.19	20

McCampbell Analytical, Inc.
1534 Willow Pass Rd
Pittsburg, CA 94565-1701
(925) 252-9262

CHAIN-OF-CUSTODY RECORD

WorkOrder: 2303G74 **ClientCode: RGAE**

☐ WaterTrax ☐ CLIP ☐ EDF ☒ EQuIS ☒ Dry-Weight ☑ Email ☐ HardCopy ☐ ThirdParty ☐ J-flag
☒ Detection Summary ☐ Excel

Report to:
Karin Schroeter
Terracon
1220 Concord Avenue, Suite 450
Concord, CA 94520
(510) 547-7771 FAX: (510) 547-1983

Email: Karin.Schroeter@Terracon.com; karin@rga
cc/3rd Party:
PO:
Project: R1237170; Station #44-501 Stetson St., Moss Beach, CA

Bill to:
Paul King
Terracon
1220 Concord Avenue, Suite 450
Concord, CA 94520
apinvoices@terracon.com

Requested TAT: **5 days;**

Date Received: **03/23/2023**
Date Logged: **03/23/2023**

Lab ID	ClientSampID	Matrix	Collection Date	Hold	Requested Tests (See legend below) 1	2	3	4	5	6	7	8	9	10	11	12
2303G74-001	PCB-01	Caulk	3/22/2023 00:00	☐	A	A										
2303G74-002	PCB-02	Caulk	3/22/2023 00:00	☐	A	A										

Test Legend:

1	8082_PCB_SG_Caulk	2	PRDisposal Fee	3		4	
5		6		7		8	
9		10		11		12	

Prepared by: Agustina Venegas

Comments:

NOTE: Soil samples are discarded 60 days after receipt unless other arrangements are made (Water samples are 30 days).
Hazardous samples will be returned to client or disposed of at client expense.

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WORK ORDER SUMMARY

Client Name: TERRACON
Client Contact: Karin Schroeter
Contact's Email: Karin.Schroeter@Terracon.com; karin@rgaenv.com

Project: R1237170; Station #44-501 Stetson St., Moss Beach, CA
Comments:

Work Order: 2303G74
QC Level: LEVEL 2
Date Logged: 3/23/2023

☐ WaterTrax ☐ CLIP ☐ EDF ☐ Excel ☐ EQuIS ☑ Email ☐ HardCopy ☐ ThirdParty ☐ J-flag

LabID	ClientSampID	Matrix	Test Name	Containers /Composites	Bottle & Preservative	U**	Head Space	Dry-Weight	Collection Date & Time	TAT	Test Due Date	Sediment Content	Hold	Sub Out
001A	PCB-01	Caulk	SW8082 (PCBs w/ Column Style Clean-up)	1	Plastic Baggie, Extra Small	☐	☐	☐	3/22/2023	5 days	3/31/2023		☐	☐
002A	PCB-02	Caulk	SW8082 (PCBs w/ Column Style Clean-up)	1	Plastic Baggie, Extra Small	☐	☐	☐	3/22/2023	5 days	3/31/2023		☐	☐

NOTES: *** STLC and TCLP extractions require 2 days to complete; therefore, all TATs begin after the extraction is completed (i.e., One-day TAT yields results in 3 days from sample submission).**

- Organic extracts are held for 40 days before disposal; Inorganic extract are held for 30 days.

- MAI assumes that all material present in the provided sampling container is considered part of the sample - MAI does not exclude any material from the sample prior to sample preparation unless requested in writing by the client.

U = An unpreserved container was received for a method that suggests a preservation in order to extend hold time for analysis.**

2303674

Terracon

***E-MAIL REPORT TO: PROJECT MANAGER (PM) AND ADDITIONAL RECIPIENTS BELOW ***

☐ PM – S. Steiner spsteiner@terracon.com
☑ PM – K. Schroeter kmschroeter@terracon.com
☐ PM – K. Pilgrim kmpilgrim@terracon.com
☐ PM- M. Benefield msbenefield@terracon.com
☐ PM – T. Kattchee takattchee@terracon.com
☐ PM – W. Frieszell wmfrieszell@terracon.com
☐ PM – D. Block david.block@terracon.com
☐ denise.wallen@terracon.com Engineering Assistant
☐ eric.dyer@terracon.com Engineering Assistant

PCB
CHAIN OF CUSTODY

EPA 8082/8082A Aroclors Only
Reporting Limit 50ppb
☐ Cleanup Approved

PAGE 1 OF 1

Project Name/ Address/ Building No. Station #44-501 Stetson St, Moss Beach CA
Project# R1237170 Sampled By: SR/DM Sampling Date: 3/22/23
Sample(s) sent to: McCampell TAT ☐ 1 Day ☐ 2 Day ☐ 3 Day ☒ 5 Day

HM# PCB-01	Material Description: White wood panel/Trim sealant	
Sample ID	Sample Location & Material Location	Quantity:
PCB-01	SE side of Building	80 ft

HM# PCB-02	Material Description: Black window sealant frame to wood trim	
Sample ID	Sample Location & Material Location	Quantity:
PCB-02	Glass windows at entry	10 ft

HM# PCB-	Material Description:	
Sample ID	Sample Location & Material Location	Quantity:

HM# PCB-	Material Description:	
Sample ID	Sample Location & Material Location	Quantity:

Relinquished By:	Steve Rogers	Signature		Date/Time:	3/23/23 9:30
Received By:	AGUSTINA	Signature:	AGUSTINA	Date/ Time:	3/23/2023 0930
Received By:		Signature:		Date/Time:	

1466 66th Street Emeryville CA 94608 Tel: (510) 547-7771 Fax: (510) 547-1983

1.40 WEA

McCampbell Analytical, Inc.
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Toll Free Telephone: (877) 252-9262 / Fax: (925) 252-9269
http://www.mccampbell.com / E-mail: main@mccampbell.com

Sample Receipt Checklist

Client Name:	Terracon	Date and Time Received:	3/23/2023 09:30
Project:	R1237170; Station #44-501 Stetson St., Moss Beach, CA	Date Logged:	3/23/2023
		Received by:	Agustina Venegas
WorkOrder №:	2303G74 Matrix: Caulk	Logged by:	Agustina Venegas
Carrier:	Client Drop-In		

Chain of Custody (COC) Information

	Yes	No	NA
Chain of custody present?	☑	☐	
Chain of custody signed when relinquished and received?	☑	☐	
Chain of custody agrees with sample labels?	☑	☐	
Sample IDs noted by Client on COC?	☑	☐	
Date and Time of collection noted by Client on COC?	☑	☐	
Sampler's name noted on COC?	☑	☐	
COC agrees with Quote?	☐	☐	☑

Sample Receipt Information

	Yes	No	NA
Custody seals intact on shipping container/cooler?	☐	☐	☑
Custody seals intact on sample bottles?	☐	☐	☑
Shipping container/cooler in good condition?	☑	☐	
Samples in proper containers/bottles?	☑	☐	
Sample containers intact?	☑	☐	
Sufficient sample volume for indicated test?	☑	☐	

Sample Preservation and Hold Time (HT) Information

	Yes	No	NA
All samples received within holding time?	☑	☐	☐
Samples Received on Ice?	☑	☐	

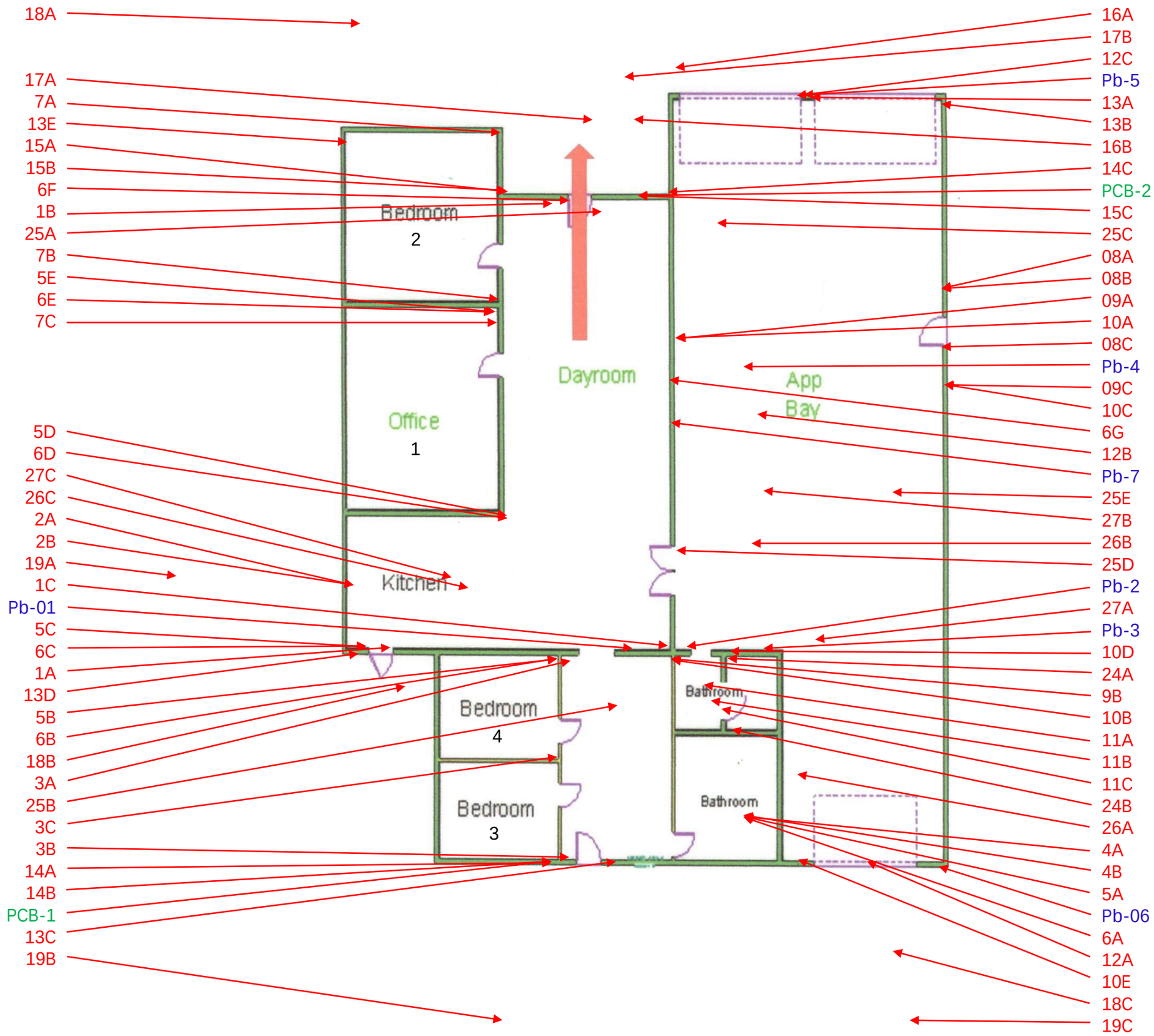
(Ice Type: BLUE ICE)

Sample/Temp Blank temperature	Temp: 1.4°C		NA ☐
ZHS conditional analyses: VOA meets zero headspace requirement (VOCs, TPHg/BTEX, RSK)?	Yes ☐	No ☐	NA ☑
Sample labels checked for correct preservation?	Yes ☑	No ☐	
pH acceptable upon receipt (Metal: <2; Nitrate 353.2/4500NO3: <2; 522: <4; 218.7: >8)?	Yes ☐	No ☐	NA ☑
UCMR Samples:			
pH tested and acceptable upon receipt (200.7: ≤2; 533: 6 - 8; 537.1: 6 - 8)?	Yes ☐	No ☐	NA ☑
Free Chlorine tested and acceptable upon receipt (<0.1mg/L) [not applicable to 200.7]?	Yes ☐	No ☐	NA ☑

Comments:

Appendix 4:

Material and Sample Location Drawings



Legend:

- Asbestos sample locations
- Lead sample locations
- PCB's Sample Locations

N

No Scale

Terracon

Station #44

501 Stetson Street

Moss Beach, California

Sample Locations

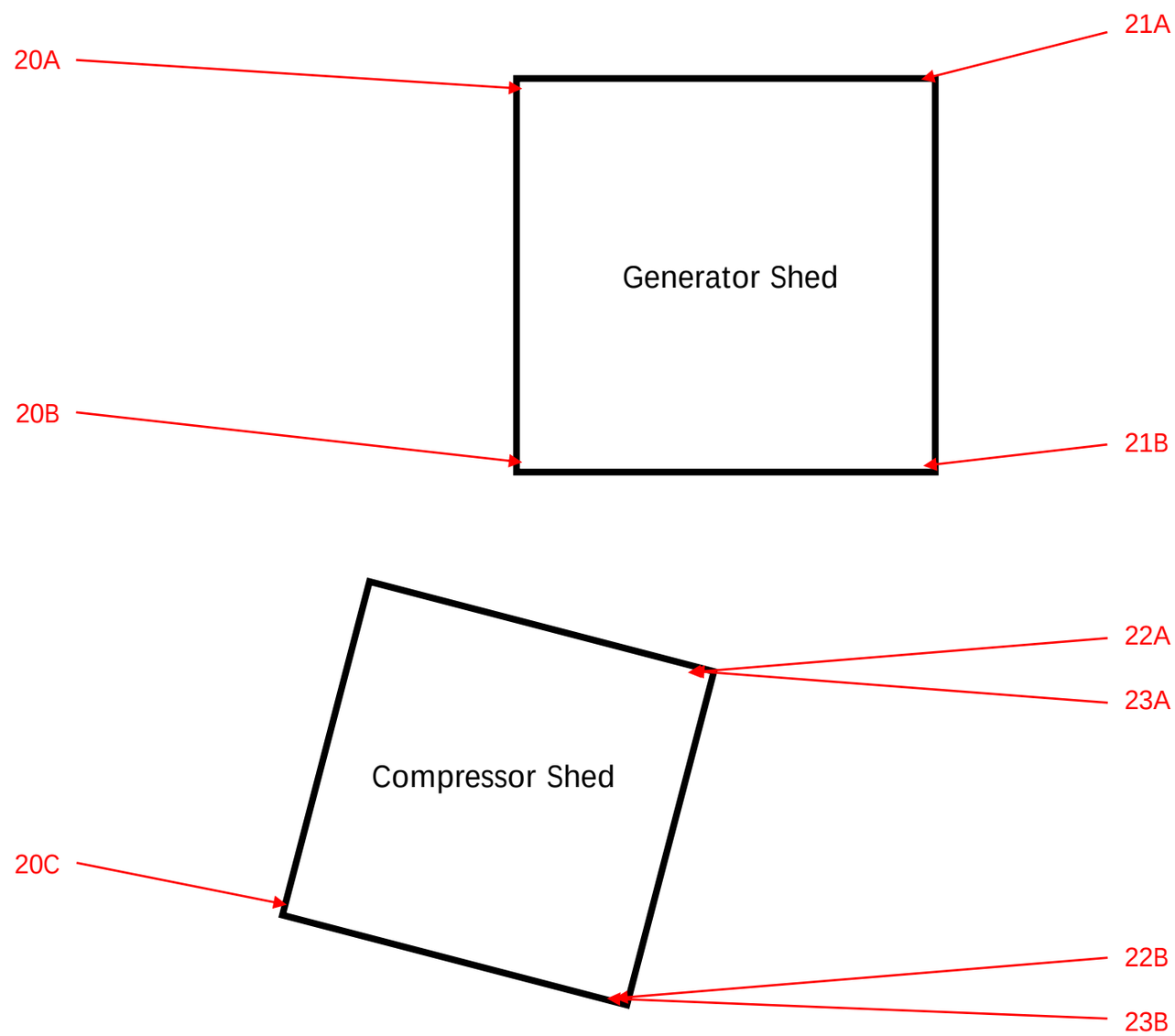
Date	Drafted By
March 2023	ALC
Project Number	**Checked By**
R1237170	KMS

Sheet Name

Main Structure

Sheet Number

Figure 1



Legend:

→ Asbestos sample locations

N

No Scale

Station #44

501 Stetson Street

Moss Beach, California

Sample Locations

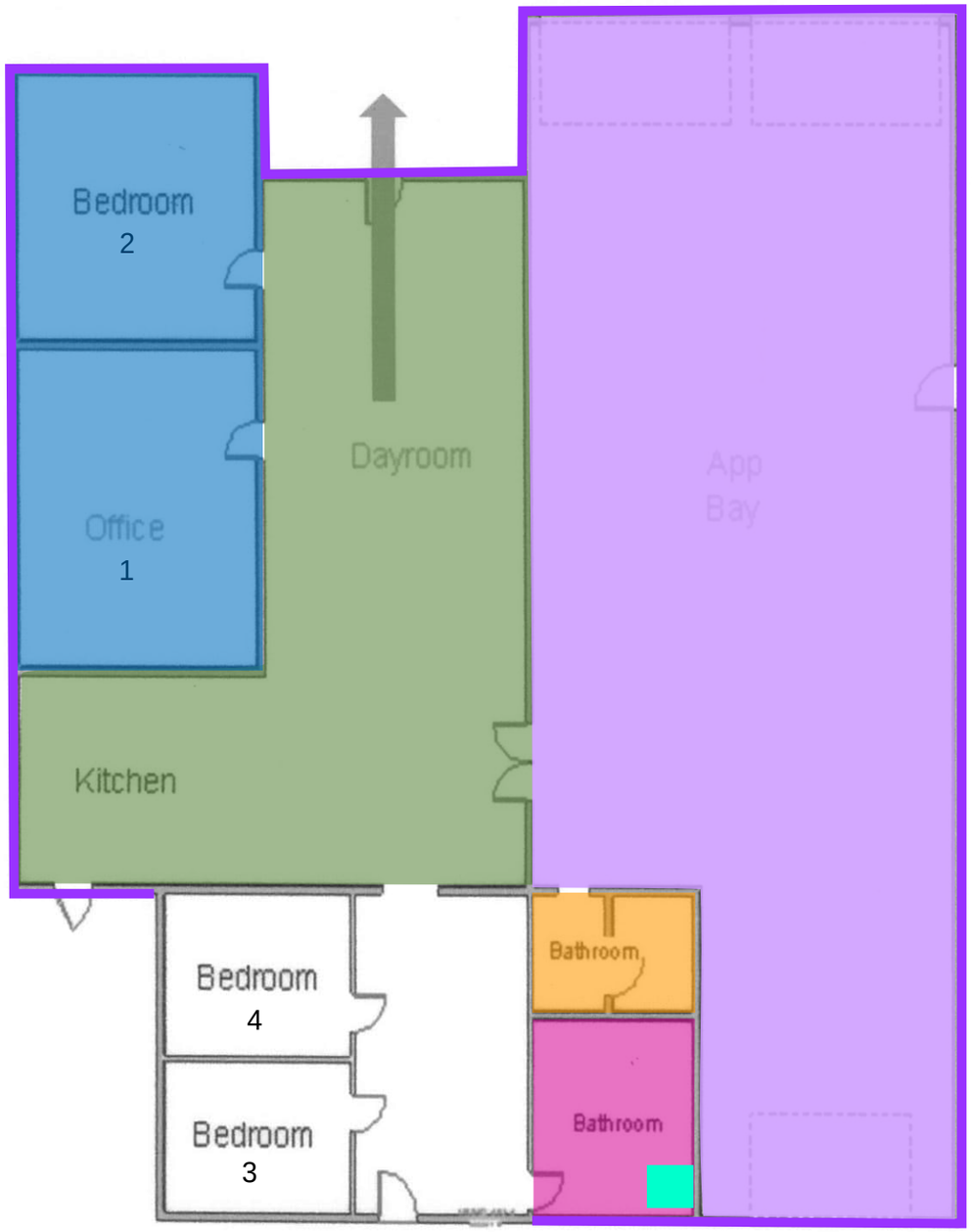
Date	Drafted By
March 2023	ALC
Project Number	**Checked By**
R1237170	KMS

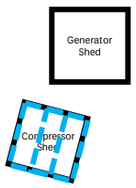
Sheet Name

Generator and Compressor Sheds

Sheet Number

Figure 2





Legend:

- Asbestos containing three (3) layer vinyl floor tile system with brown floor tile (3% CH) and black mastic (3% CH)
- Asbestos containing tan vinyl sheet flooring system with black mastic (3% CH) under wood flooring
- Asbestos containing 12" floor tile system with (brown tile 3% CH) and black mastic (3% CH)
- Asbestos containing 9" vinyl floor tile system with brown/beige floor tile (3% CH and black mastic (3% CH)
- Asbestos containing textured stucco system with grey stucco (<1% CH)
- Asbestos containing grey roof patch (5% CH)
- Assumed asbestos and lead containing 4" yellow ceramic shower tile system
- Lead containing tan paint (2,700 ppm) on wood ceiling beam

The following materials are not depicted:

- Asbestos containing textured drywall system with off-white texture and off-white joint compound with paint (2% CH) throughout the main structure
- Asbestos containing tan sealant (2% CH) at exterior wood panel stucco joins

PCBs were not detected in the sampled materials above the laboratory detection limit.

N
No Scale

Terracon

Station #44

501 Stetson Street

Moss Beach, California

Material Locations

Date	Drafted By
March 2023	ALC
Project Number	**Checked By**
R1237170	KMS

Sheet Name
Main Structure & Sheds

Sheet Number
Figure 3

Appendix 5:

Photo Pages

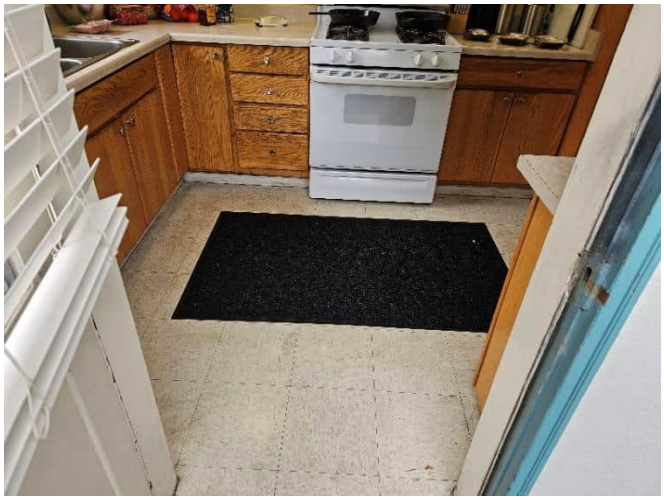


Photo 1: HM# 01 Asbestos containing three (3) layer vinyl floor tile system with brown floor tile (3% CH) and black mastic (3% CH)

Photo 2: HM# 01 Asbestos containing three (3) layer vinyl floor tile system with brown floor tile (3% CH) and black mastic (3% CH)

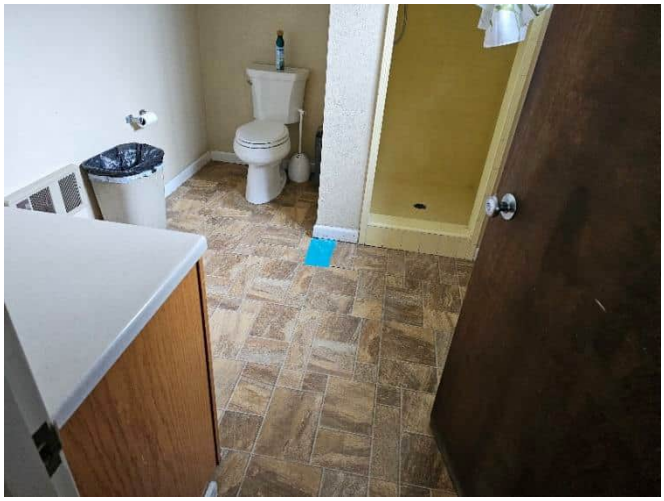


Photo 3: HM# 04 Asbestos containing tan vinyl sheet flooring system with black mastic (3% CH) under wood flooring

Photo 4: HM#7 Asbestos containing 12" floor tile system with (brown tile 3% CH) and black mastic (3% CH) Under Carpet

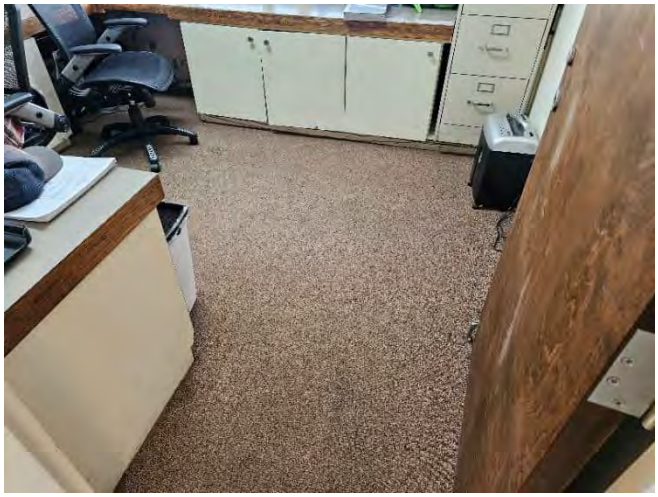


Photo 5: HM#7 Asbestos containing 12" floor tile system with (brown tile 3% CH) and black mastic (3% CH) Under Carpet

Photo 6: HM#11 Asbestos containing 9" vinyl floor tile system with brown/beige floor tile (3% CH and black mastic (3% CH)

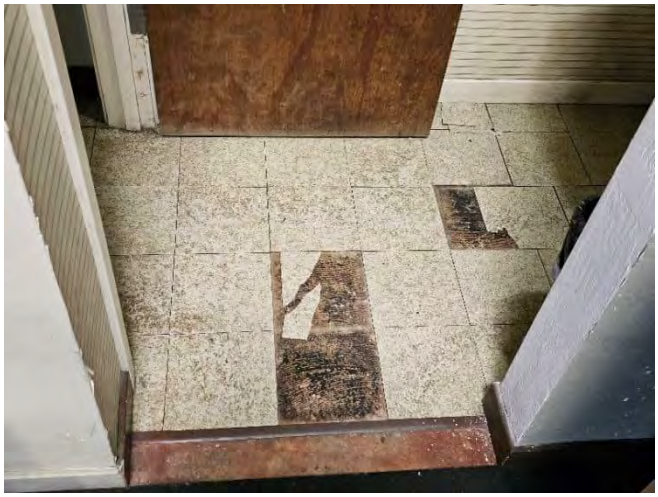


Photo 7: HM#11 Asbestos containing 9" vinyl floor tile system with brown/beige floor tile (3% CH and black mastic (3% CH)

Photo 8: HM#28 Assumed asbestos and lead containing 4" yellow ceramic shower tile system

Photo 9: HM#13 Asbestos containing textured stucco system with grey stucco (<1% CH)

Photo 10: HM#13 Asbestos containing textured stucco system with grey stucco (<1% CH)

Photo 11: HM#14 Asbestos containing tan sealant (2% CH) at exterior wood panel stucco joins

Photo 12: HM#14 Asbestos containing tan sealant (2% CH) at exterior wood panel stucco joins

Photo 13: HM#23 Asbestos containing grey roof patch (5% CH) on Compressor Shed roof

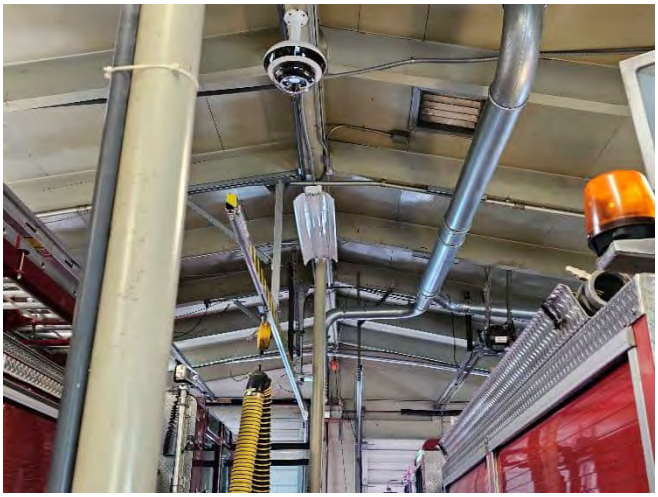


Photo 14: Pb-04 Lead containing Tan paint (2,700 ppm) on Wood Ceiling Beam in the APP Bay

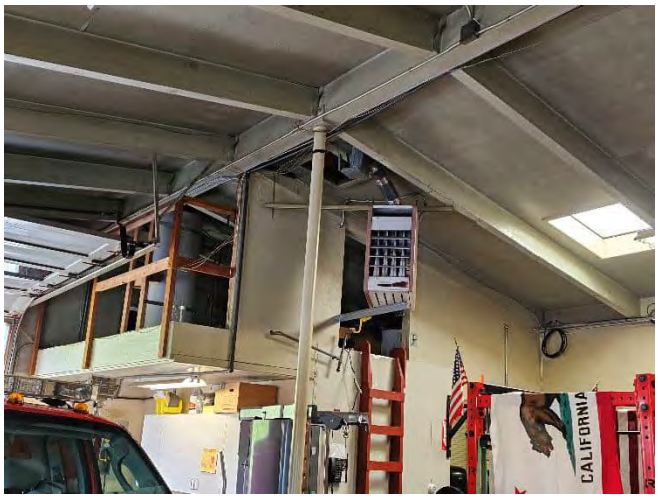


Photo 15: Pb-04 Lead containing Tan paint (2,700 ppm) on Wood Ceiling Beam in the APP Bay

Appendix 6:

Site Inspector Certifications

STATE OF CALIFORNIA
DEPARTMENT OF PUBLIC HEALTH

LEAD-RELATED CONSTRUCTION CERTIFICATE

INDIVIDUAL:	CERTIFICATE TYPE:	NUMBER:	EXPIRATION DATE:
Steven Rogers	Lead Sampling Technician	LRC-00005533	5/25/2023

Disclaimer: This document alone should not be relied upon to confirm certification status. Compare the individual's photo and name to another valid form of government issued photo identification. Verify the individual's certification status by searching for Lead-Related Construction Professionals at www.cdph.ca.gov/programs/clppb or calling (800) 597-LEAD

State of California
Division of Occupational Safety and Health

Certified Site Surveillance Technician

Irma Medina

Name

Certification No. 11-4799

Expires on 10/19/23

This certification was issued by the Division of Occupational Safety and Health as authorized by Sections 7180 et seq. of the Business and Professions Code.

STATE OF CALIFORNIA
DEPARTMENT OF PUBLIC HEALTH

LEAD-RELATED CONSTRUCTION CERTIFICATE

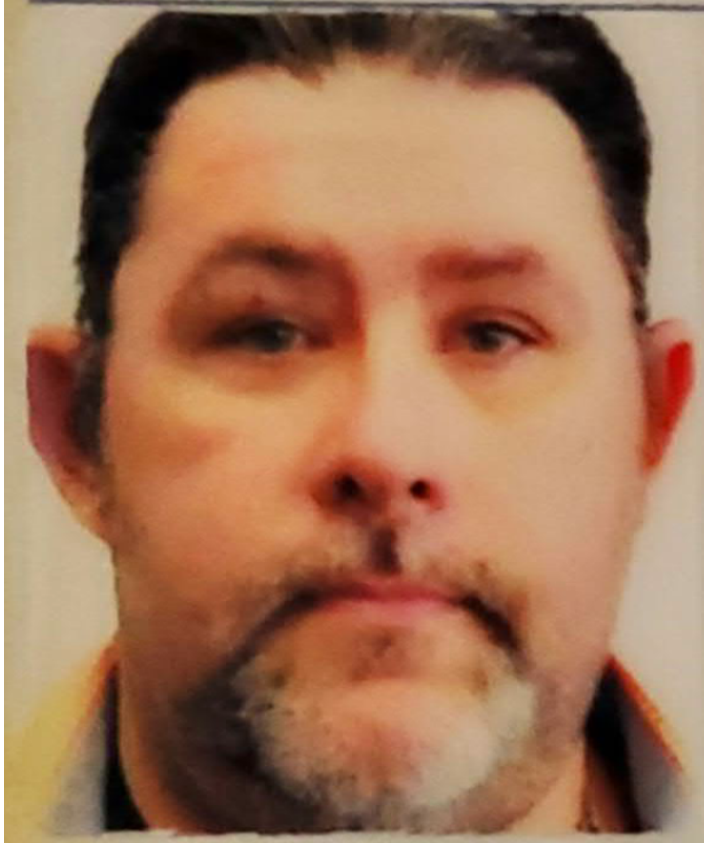
INDIVIDUAL:	CERTIFICATE TYPE:	NUMBER:	EXPIRATION DATE:
Irma Medina	Lead Sampling Technician	LRC-00003667	12/8/2023

Disclaimer: This document alone should not be relied upon to confirm certification status. Compare the individual's photo and name to another valid form of government issued photo identification. Verify the individual's certification status by searching for Lead-Related Construction Professionals at www.cdph.ca.gov/programs/clppb or calling (800) 597-LEAD

State of California
Division of Occupational Safety and Health

Certified Site Surveillance Technician

Steven B Rogers



Name

Certification No. **08-4408**

Expires on **08/21/23**

This certification was issued by the Division of Occupational Safety and Health as authorized by Sections 7180 et seq. of the Business and Professions Code.

APPENDIX 4

Hazardous Waste Tank Closure Certification

UNIFIED PROGRAM CONSOLIDATED FORM
HAZARDOUS WASTE

HAZARDOUS WASTE TANK CLOSURE CERTIFICATION

I. FACILITY IDENTIFICATION

BUSINESS NAME (Same as FACILITY NAME or DBA – Doing Business As) 3.	FACILITY ID# 1.
TANK OWNER NAME 740.	
TANK OWNER ADDRESS 741.	
TANK OWNER CITY 742.	STATE 743. / ZIP CODE 744.

II. TANK CLOSURE INFORMATION

TANK INTERIOR ATMOSPHERE READINGS	Tank ID # (Attach additional copies of this page for more than three tanks)	Concentration of Flammable Vapor			Concentration of Oxygen		
		Top	Center	Bottom	Top	Center	Bottom
1	745.	746a.	746b.	746c.	747a.	747b.	747c.
2	748.	749a.	749b.	749c.	750a.	750b.	750c.
3	751.	752a.	752b.	752c.	753a.	753b.	753c.

III. CERTIFICATION

On examination of the tank, I certify the tank is visually free from product, sludge, scale (thin, flaky residual of tank contents), rinseate and debris. I further certify that the information provided herein is true and accurate to the best of my knowledge.

SIGNATURE OF CERTIFIER

NAME OF CERTIFIER (Print) 754.

TITLE OF CERTIFIER 755.

ADDRESS 756.

CITY 757.

PHONE 758.

DATE 759. | CERTIFICATION TIME

STATUS OR AFFILIATION OF CERTIFYING PERSON

Certifier is a representative of the CUPA, authorized agency, or LIA: 760.

☐ Yes ☒ No

Name of CUPA, authorized agency, or LIA: 761.

N/A

If certifier is other than CUPA / LIA check appropriate box below: 762.

- ☐ a. Certified Industrial Hygienist (CIH)
- ☐ b. Certified Safety Professional (CSP)
- ☐ c. Certified Marine Chemist (CMC)
- ☐ d. Registered Environmental Health Specialist (REHS)
- ☐ e. Professional Engineer (PE)
- ☐ f. Class II Registered Environmental Assessor
- ☐ g. Contractors' State License Board licensed contractor (with hazardous substance removal certification)

TANK PREVIOUSLY HELD FLAMMABLE OR COMBUSTIBLE MATERIALS 763.

(If yes, the tank interior atmosphere shall be re-checked with a combustible gas indicator prior to work being conducted on the tank.) ☐ Yes ☐ No

CERTIFIER'S TANK MANAGEMENT INSTRUCTIONS FOR SCRAP DEALER, DISPOSAL FACILITY, ETC: 764.

A copy of this certificate shall accompany the tank to the recycling/disposal facility and be provided to the agency overseeing tank closure (i.e. CUPA or other authorized local agency); the owner and/or operator of the tank system; and the tank removal contractor.

Hazardous Waste Tank Closure Certification Instructions

Complete and submit this page after cleaning any underground or aboveground tank system subject to Title 22, Division 4.5, Chapter 32, California Code of Regulations. Refer to 22 CCR §67383.3 and 23 CCR §2672 for disposal requirements for tank systems.

Completed Unified Program Consolidated Form (UPCF) Business Activities and Business Owner/Operator Identification (OES Form 2730) pages must be submitted with this form. Please number all pages of your submittal. (Note: Numbering of the following instructions follows the UPCF data element numbers on this form.)

1. FACILITY ID NUMBER - This number is for agency use only. Leave this space blank.

3. BUSINESS NAME - Enter the complete Facility Name.

740. TANK OWNER NAME -
741. TANK OWNER ADDRESS -
742. TANK OWNER CITY -
743. TANK OWNER STATE -
744. TANK OWNER ZIP CODE -

Complete items 740-744 unless all items are the same as the Business Owner information (items 111-116) on the Business Owner/Operator Identification page (OES Form 2730). If the same, write "SAME AS SITE" across this section.

745. TANK ID NUMBER 1-3 - Enter up to three owner tank ID numbers. These are unique numbers used by the owner to identify each tank. If more than three tanks are being closed, complete additional copies of this page. (Enter additional tank numbers in 748 and 751.)

746. CONCENTRATION OF FLAMMABLE VAPOR 1-3 - Enter interior flammable vapor concentration readings taken at the top, center, and bottom of the tank. (If more than one tank, enter additional tank readings in 749 and 752.)

747. CONCENTRATION OF OXYGEN 1-3 - Enter interior oxygen readings taken at the top, center, and bottom of the tank. (If more than one tank, enter additional tank readings in 750 and 753).

SIGNATURE - A qualified professional meeting the requirements of 22 CCR §67383.3(f) shall sign in the space provided to certify that the cleaned tank(s) meet all standards specified in 22 CCR §67383.3(e)(1) and (2).

754. CERTIFIER NAME - Print or type the full name of the person signing the Certification.

755. CERTIFIER TITLE - Enter the title of the person signing the Certification.

756. CERTIFIER ADDRESS - Enter the address of the person signing the Certification.

757. CERTIFIER CITY - Enter the city for the signer's address.

758. CERTIFIER PHONE - Enter the phone number for the person signing the Certification.

759. DATE CERTIFIED - Enter the date that the Certification was signed. Enter the time that the readings were taken.

760. CERTIFIER REPRESENTS LOCAL AGENCY - Check "Yes" if the person certifying the tank is a representative of a CUPA or authorized local agency, otherwise, check "No."

761. NAME OF LOCAL AGENCY - If certified by a CUPA or other local agency, enter the name of the agency.

762. AFFILIATION OF CERTIFYING PERSON - Check the certification, license, or organization which the certifier holds or to which the certifying person belongs, if not a CUPA or other local agency.

763. TANK HELD FLAMMABLE OR COMBUSTIBLE MATERIALS - Check "Yes" if the tank(s) previously held flammable or combustible materials, otherwise check "No."

764. MANAGEMENT INSTRUCTIONS - Provide tank management instructions to the scrap dealer, disposal facility, etc. in this space.

APPENDIX 5

Sample Schedule of Values (For reference only)

SAMPLE SCHEDULE OF VALUES

(This is a Sample Schedule of Values for the Fire Station 44 Replacement Project. It is being provided to Bidders to illustrate the general level of detail expected for the Schedule of Values required to be submitted prior to the Preconstruction Meeting, per the Project Specifications)

SECTION 01 29 73 SCHEDULE OF VALUES - SAMPLE

PART 1 GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section Includes: Schedule of values listing to be edited by Contractor of description of Work, not scheduled value, Work completed, stored materials, total complete, percentage, balance to finish, and retainage. These parts must remain intact.

B. Related Sections:
   1. Section 01 29 00: Payment Procedures.

1.3 DEFINITIONS

A. Pencil Copy: A copy submitted prior to a final/official submission on a monthly basis.

B. Schedule of Values: A statement furnished by Contractor allocating portions of the Contract Sum to various portions of the Work and used as the basis for reviewing Contractor's Applications for Payment.

1.4 SCHEDULE OF VALUES

MATRIX TO START ON NEXT PAGE:

PBK-WLC Architects
Project No. XXXX

Project
Owner:

This is a sample illustration:

Item No.	Description of Work	Scheduled Value	Work Completed		Stored Materials	Total Completed	%	Balance To Finish	Retainage
			Previous App.	This App.					
	Div. 1 - General Reqs.								
	Site Work General Conditions								
	Supervision								
	Mobilization								
	Bonds & Insurance								
	Permits								
	Contractor's Fee								
	Closeout Documents								
	Div. 1 - Total								
	Div. 2 - Existing Conditions								
	Demolition (As applicable)								
	Erosion Control								
	Div. 2 - Total								
	Div. 3 - Concrete								
	Drill Piers								
	Caps & Beams								
	Slab on Grade								
	Cooling Tower Basin								
	Misc Bldg Conc								
	Floor Sealer								
	Rebar Matl								
	Rebar Labor								
	Lt.Wt.Insul Fill - Materials								
	Lt.Wt.Insul Fill - Labor								
	Submittals/Closeout Documents								
	Supervision Clean-up								
	Div. 3 - Total								
	Div 4 - Masonry								
	Brickwork - Labor								
	Brickwork - Matls								
	Concrete Masonry - Labor								
	Concrete Masonry - Materials								
	Str. Glazed Tile-Labor								
	Str. Glazed Tile-Materials								
	Submittals/Closeout Documents								
	Supervision Clean-up								
	Div. 4 - Total								
	Div 5 - Metals								
	Structural Steel - Labor								
	Structural Steel - Materials								
	Alternating Stairs								
	Misc. Steel - Materials								
	Steel Joists - Materials								
	Lt. Gauge Steel Framing-Labor								
	Lt. Gauge Steel Framing-Matls								
	Metal Decking - Labor								
	Expansion Joint Covers								

Item No.	Description of Work	Scheduled Value	Work Completed		Stored Materials	Total Completed	%	Balance To Finish	Retainage
			Previous App.	This App.					
	Detailing Submittals/Closeout Documents Supervision Clean-up								
	Div. 5 - Total								
	Div. 6 - Wood & Plastics Rough Carpentry - Labor Rough Carpentry - Materials Millwork - Labor Millwork - Materials Submittals/Closeout Documents								
	Div. 6 - Total								
	Div. 7 - Thermal and Moisture Protection Waterpfng / Dampprfng-Matls Waterpfng / Dampprfng-Labor Building Insulation - Labor Building Insulation - Materials Fireproofing - Labor Fireproofing - Materials Metal Roof - Labor Metal Roof - Materials Metal Roof Guarantee Built-up Roofing-Labor Built-up Roofing-Materials Built-up Roofing Guarantee Roof Accessories Building Sheet Metal - Labor Building Sheet Metal - Matls Bldg. Sheet Metal Guarantee Roof Curbs Roof Hatches Sealants Submittals/Closeout Documents Supervision Clean-up								
	Div. 7 - Total **Div. 8 - Doors and Frames** Finish Carpentry/Door - Labor Finish Hardware - Matls Thresholds & Seals - Matls+B66 Hollow Metal Doors & Frames - Matls Plastic Faced Doors-Matls Overhead Doors & Grilles-Labor Overhead Doors & Grilles - Matls Alum. Entrances & Store-fronts - Labor								

Item No.	Description of Work	Scheduled Value	Work Completed		Stored Materials	Total Completed	%	Balance To Finish	Retainage
			Previous App.	This App.					
	fronts - Matls								
	Alum. Windows - Labor								
	Alum Windows - Matls								
	Glass & Glazing-Labor								
	Glass & Glazing-Matls								
	Submittals/Closeout Documents								
	Supervision Clean-up								
	Div. 8 - Total								
	Div. 9 - Finishes								
	Lath & Plaster-Labor								
	Lath & Plaster-Matls								
	Gypsum Wallboard Systems - Labor								
	Gypsum Wallboard Systems - Matls								
	Ceramic Tile - Labor								
	Ceramic Tile - Matls								
	Quarry Tile - Labor								
	Quarry Tile - Matls								
	Terrazzo-Labor								
	Terrazzo-Matls								
	Acoustic Clg. - Labor								
	Acoustic Clg. - Matls								
	Acoustic Wall Panels								
	Resilient Flooring - Labor								
	Resilient Flooring - Matls								
	Carpet - Labor								
	Carpet - Matls								
	Athletic Flooring - Materials								
	Athletic Flooring - Labor								
	Floor Sealer								
	Painting - Labor								
	Painting - Mtls								
	Submittals/Closeout Documents								
	Supervision Clean-up								
	Div. 9 - Total								
	Div. 10 - Specialties								
	Visual Display Boards & Tackboards - Materials								
	Visual Display Boards & Tackboards - Labor								
	Toilet Partitions - Labor								
	Toilet Partitions - Matls								
	Louvers								
	Aluminum Flag Pole								
	Graphics								
	Lockers								
	Cubicle Curtains & Track								
	Fire Extinguisher Cabinets								
	Demountable Partitions-Labor								

Item No.	Description of Work	Scheduled Value	Work Completed		Stored Materials	Total Completed	%	Balance To Finish	Retainage
			Previous App.	This App.					
	Demountable Partitions-Matls								
	Shelving								
	Toilet Room Accessories-Matls								
	Toilet Room Accessories-Lbr								
	Submittals/Closeout Documents								
	Supervision Clean-up								
	Div. 10 - Total								
	Div. 11 - Equipment								
	Stage Curtains								
	Misc. Appliances								
	Food Service Eqpt-Labor								
	Food Service Eqpt-Matls								
	Submittals/Closeout Documents								
	Supervision Clean-up								
	Div. 11 - Total								
	Div. 12 - Furnishings								
	Horizontal Blinds								
	Projection Screens								
	Casework - Labor								
	Casework - Matls								
	Science Casework - Labor								
	Science Casework - Matls								
	Submittals/Closeout Documents								
	Supervision Clean-up								
	Div. 12 - Total								
	Div. 13 - Specialties								
	Stage Curtains and Draperies								
	Music Instrument Storage								
	Bleachers								
	Press Box								
	Pre-eng. Metal Bldg.								
	Stadium Seating								
	Submittals/Closeout Documents								
	Supervision Clean-up								
	Div. 13 - Total								
	Div. 14 - Conveying Systems								
	Platform Lifts								
	Elevators								
	Submittals/Closeout Documents								
	Supervision Clean-up								
	Div. 14 - Total								
	Div. 21, 22 - Plumbing								
	Shop Drawings								
	As-Builts/Closeout/ O&M Manuals								
	Sanitary Underground – Labor								

Item No.	Description of Work	Scheduled Value	Work Completed Previous App.	Work Completed This App.	Stored Materials	Total Completed	%	Balance To Finish	Retainage
	Sanitary Underground - Matls								
	Storm Underground - Labor								
	Storm Underground - Matls								
	Domestic Water - Labor								
	Domestic Water - Matls								
	Plumbing Insulation - Matls								
	Plumbing Insulation - Labor								
	Gas Piping - Matls								
	Gas Piping - Labor								
	Grease Trap								
	Plumbing Fixtures - Matls								
	Plumbing Fixtures - Labor								
	Coordination Drawings								
	Submittals/Closeout Documents								
	Supervision Clean-up								
	Div. 21, 22 Plumbing - Total								
	Div. 23 - Mechanical								
	Shop Drawings								
	As-Builts/Closeout/ O&M Manuals								
	Chillers - Matls								
	Chillers - Labor								
	Cooling Towers - Matls								
	Cooling Towers - Labor								
	Boilers - Matls								
	Boilers - Labor								
	AHU's - Matls								
	AHU's - Labor								
	Fans - Matls								
	Fans - Labor								
	Grilles - Matls								
	Grilles - Labor								
	Ductwork - Matls								
	Ductwork - Labor								
	Pumps - Mtls								
	Pumps - Labor								
	Water Treatment - Labor								
	Water Treatment - Matls								
	Isolation - Labor								
	Isolation - Matls								
	Pipe Flex - Matls								
	Pipe Flex - Labor								
	Connections								
	Sheet Metal - Matls								
	Sheet Metal - Labor								
	Duct Insulation - Matls								
	Duct Insulation - Labor								

Item No.	Description of Work	Scheduled Value	Work Completed		Stored Materials	Total Completed	%	Balance To Finish	Retainage
			Previous App.	This App.					
	Pipe Insulation - Matls								
	Pipe Insulation - Labor								
	VAV Boxes - Materials								
	VAV Boxes - Labor								
	Refrigerant Monitor - Matls								
	Refrigerant Monitor - Labor								
	Unit Heaters - Materials								
	Unit Heaters - Labor								
	Startup								
	Controls - Matls								
	Control - Labor								
	Engineer / Submittals								
	Modules / End Devices								
	Low Voltage Wiring								
	Startup								
	Closeout Documents								
	Fire Sprinkler								
	Engineer / Submittals								
	Piping - Materials								
	Piping - Labor								
	Equipment - Materials								
	Equipment - Labor								
	Trimout - Materials								
	Trimout - Labor								
	Pipe, Valves, Fittings - Labor								
	Pipe, Valves, Fittings - Matls								
	Misc. - Matls								
	Insulation - Matls								
	Insulation - Labor								
	Sanitary Above Slab-Labor								
	Sanitary Above Slab-Matls								
	Storm Above Slab - Labor								
	Storm Above Slab - Matls								
	Gas - Labor								
	Gas - Matls								
	Fixtures - Labor								
	Fixtures - Matls								
	Permits								
	Coordination Drawings								
	Submittals/Closeout Documents								
	Supervision Clean-up								
	Div. 23 Mechanical - Total								
	Div. 26 - Electrical								
	Mobilization+B220								
	Shop Drawings								
	As-Builts/Closeout/ O&M Manuals								
	Underground								
	Conduit - Labor								
	Conduit - Matl								
	Wire - Labor								

Item No.	Description of Work	Scheduled Value	Work Completed		Stored Materials	Total Completed	%	Balance To Finish	Retainage
			Previous App.	This App.					
	Wire - Matls								
	Feeder Wire - Labor								
	Feeder Wire - Matls								
	Switches/Recpt.								
	Switchgear - Labor								
	Switchgear - Matls								
	Temporary - Materials								
	Temporary - Labor								
	Gas Generator - Materials								
	Gas Generator - Labor								
	Fixtures - Labor								
	Fixtures - Matls								
	Communications - Labor								
	Communications - Matls								
	Fire Alarm - Labor								
	Fire Alarm - Matls								
	Security - Labor								
	Security - Matls								
	Low Voltage Ltng Sys-Matls								
	Low Voltage Ltng Sys-Labor								
	Voice System - Materials								
	Voice System - Labor								
	Video System - Materials								
	Video System - Labor								
	Data System - Materials								
	Data System - Labor								
	Master Clock - Materials								
	Master Clock - Labor+B277								
	Coordination Drawings								
	Submittals/Closeout Documents								
	Supervision Clean-up								
	Div. 26 - Total								
	Divs. 31, 32 and 33 - Earthwork, Exterior Improvements and Utilities								
	Site Clearing & Grubbing								
	Building Pad - Materials								
	Building Pad - Labor								
	Paving Subgrade								
	Signage / Striping								
	Bike Racks								
	Landscaping - Materials								
	Landscaping - Labor								
	Hydro Mulch - Materials								
	Hydro Mulch - Labor								
	Irrigation - Materials								
	Irrigation - Labor								
	Earthwork								
	Finish Grading								
	Stabilization - Materials								
	Stabilization - Labor								
	Site Drainage - Materials								
	Site Drainage – Labor								

Item No.	Description of Work	Scheduled Value	Work Completed		Stored Materials	Total Completed	%	Balance To Finish	Retainage
			Previous App.	This App.					
	Chain Link Fence-Materials								
	Chain Link Fence-Labor								
	Paving - Labor								
	Paving - Materials								
	Sidewalks								
	Submittals/Closeout Documents								
	Supervision Clean-up								
	Div. 31, 32 and 33 - Total								
	General Conditions								
	Mobilization								
	Temp. Facilities								
	Final Cleaning								
	Record Documents/Closeout/ O&M Manuals								
	Supervision								
	Permits								
	Bonds								
	Insurance								
	Allowances								
	Alternates (list)								
	Change Orders								
	A. PR#								
	B. PR#								
	C. PR#								

END OF SECTION 01 29 73

APPENDIX 6

Submittal List (For reference only)

Preliminary SUBMITTAL LIST
Fire Station 44 Replacement Project

(This list is being provided for Bidder's reference only. It may not include all submittals required on the project. Per the Specifications, Contractor will be required to submit a Submittal List for District review prior to the Preconstruction Meeting)

01 29 73	Schedule of Values
01 31 00	Preliminary Construction Schedule
01 50 00	Temporary Facilities and Controls
01 77 22	Substantial Completion Procedures: Punchlist, Initial Substantial Completion
01 78 23	Operation and Maintenance Data: O&M Manual
01 78 39	Project Record Documents: Record Drawings, Specifications, Product Data
01 79 00	Demonstration and Training: Instructor Program, Qualification Data, Attendance Record
02 41 00	Demolition Plan: Schedule, Procedures
03 11 00	Concrete Formwork
03 20 00	Concrete Reinforcing
03 30 00	Cast-in-Place Concrete: Product Data, Manufacturer's Instructions
03 35 10	Polished Concrete Floor System: Product Data, Manufacturer's Instructions
04 05 13	Masonry Mortar: Product Data, Manufacturer's Instructions
04 20 00	Unit Masonry: Product Data, Manufacturer's Instructions
04 73 00	Manufactured Stone Masonry: Product Data, Manufacturer's Instructions
05 12 00	Structural Steel Framing: Shop Drawings, Manufacturer's Mill Certificate, Mill Test Reports, Welders' Certificates
05 31 13	Steel Floor Decking: Shop Drawings, Product Data, Welders' Certificates
05 50 00	Metal Fabrications
05 51 00	Metal Stairs: Shop Drawings, Welders' Certification
05 51 33	Metal Ladders: Shop Drawings
05 52 00	Metal Railings
06 10 00	Rough Carpentry: Product Data, Technical Data, Manufacturer's Certificate
06 20 00	Finish Carpentry and Millwork
06 40 00	Architectural Woodwork: Product Data, Shop Drawings, Samples, Qualification Data, Woodwork Quality Standard Compliance Certificates
06 41 16	Plastic-Laminate-Clad Architectural Cabinets: Shop Drawings, Product Data
07 13 53	Elastomeric Sheet Waterproofing: Product Data, Manufacturer's Instructions
07 18 00	Traffic Coating: Product Data, Samples, Manufacturer's Instructions
07 19 00	Water Repellants: Product Data, Manufacturer's Instructions
07 21 15	Continuous Wall Panel Insulation: Product Data, Manufacturer's Instructions
07 21 16	Blanket Insulation: Product Data, Manufacturer's Instructions
07 22 00	Roof and Deck Insulation: Product Data
07 22 19	Nailable Insulated Sheathing: Product Data

07 27 26	Fluid-Applied Membrane Air Barriers: Shop Drawings, Product Data, Samples, Manufacturer's Certificate and Instructions
07 31 13	Asphalt Shingles: Shop Drawings, Product Data, Samples, Manufacturer's Certificate and Instructions
07 54 23	Thermoplastic-Polyolefin Roofing: Product Data, Samples, Manufacturer's Certificate and Instructions, Applicator Qualifications
07 62 00	Sheet Metal Flashing and Trim: Shop Drawings, Product Data, Warranty, Manufacturer's Instructions
07 71 23	Manufactured Gutters and Downspouts: Shop Drawings, Product Data, Samples, Manufacturer's Instructions, Warranty
07 72 33	Roof Hatches: Product Data, Manufacturer's Certificate and Instructions
07 84 00	Firestopping: Product Data, Samples, Manufacturer's Certificate and Instructions
07 92 00	Joint Sealants: Product Data, Samples
08 11 13	Hollow Metal Doors and Frames: Shop Drawings, Product Data, Samples, Manufacturer's Instructions and Certificates
08 14 16	Flush Wood Doors: Shop Drawings, Product Data, Certificates of Compliance, Manufacturer's Instructions
08 31 13	Access Doors and Frames: Product Data, Manufacturer's Instructions
08 36 13	Sectional Overhead Doors: Shop Drawings, Product Data, Samples, Manufacturer's Instructions
08 41 13	Aluminum-Framed Entrances and Storefronts: Shop Drawings, Product Data, Hardware Schedule, Engineer's Calculations, Maintenance Data
08 51 13	Aluminum Windows: Shop Drawings, Product Data, Samples, Manufacturer's Certificates and Instructions, Installer's Experience, Warranty
08 62 23	Tubular Daylighting Devices: Shop Drawings, Electrical Wiring Diagrams, Product Data, Samples, Test Reports
08 71 00	Door Hardware: Product Data, Hardware Schedule, Shop Drawings, Keying Schedule, Proof of Compliance, Test Reports, O&M Manuals, Record Documents
08 80 00	Glazing Spandrel Glass: Product Data, Samples, Glazing Schedule, Certificates, Analyses, Test Reports
08 83 00	Mirrors: Product Data, Shop Drawings
09 29 00	Gypsum Board: Shop Drawings, Product Data, Samples, Calculations, Reports
09 30 00	Tiling: Shop Drawings, Product Data, Samples, Reports, Maintenance Instructions
09 30 50	Tile Setting Materials and Accessories: Product Data, Samples, Manufacturer's Certificates, Warranty
09 51 00	Acoustical Ceiling Panels: Product Data, Samples, Coordination Drawings, Maintenance Data, Warranty

09 54 23 Linear Metal Ceilings: Product Data, Manufacturer's Instructions, Shop Drawings, Samples
09 65 13 Resilient Base: Product Data, Samples, Maintenance Data
09 65 19.33 Resilient Rubber Tile Flooring: Product Data, Samples, Product Schedule
09 68 00 Carpeting: Product Data, Samples, Test Reports, Shop Drawings, Maintenance Data
09 68 01 Carpeting Walk-Off Mats: Product Data, Samples, Test Reports, Shop Drawings, Maintenance Data
09 90 00 Painting and Coating: Product Data, Samples, Product List, Maintenance Manual
09 97 23 Concrete Masonry Coatings
10 11 00 Markerboard, Tackboard, and Pegboard: Product Data, Shop Drawings, Samples, Test Reports
10 12 00 Display Cases: Product Data, Shop Drawings, Samples, Maintenance Data
10 14 00 Graphics and Signage: Product Data, Shop Drawings, Samples
10 26 13 Corner Guards: Product Data, Shop Drawings, Samples
10 28 13 Toilet Accessories: Product Data, Samples, Product Schedule, Maintenance Data
10 44 00 Fire Extinguisher and Cabinets: Product Data
10 51 53 Locker Room Benches: Product Data, Shop Drawings
10 56 13 Metal Storage Shelving: Product Data, Shop Drawings, Seismic Certificates
10 75 16 Ground Set Flagpoles: Product Data, Shop Drawings, Samples, O&M Data
11 14 60 Vehicle Exhaust Removal System
11 90 00 Miscellaneous Equipment: Product Data, Manufacturer's Instructions
12 24 13 Roller Window Shades: Product Data, Manufacturer's Instructions, Shop Drawings, O&M, Warranty
12 93 13 Bicycle Racks: Product Data, Manufacturer's Instructions, Quality Assurance
12 93 14 Bicycle Lockers: Product Data, Manufacturer's Instructions
14 21 23 Electric Traction Machine Room: Product Data, Manufacturer's Instructions, Shop Drawings
22 05 13 Common Motor Requirements for Plumbing Equipment: Product Data, Manufacturer's Instructions
22 05 17 Sleeves and Sleeve Seals for Plumbing Piping: Product Data, Manufacturer's Instructions
22 05 18 Escutcheons for Plumbing Piping: Product Data, Manufacturer's Instructions
22 05 23 General-Duty Valves for Plumbing Piping: Product Data, Manufacturer's Instructions
22 05 29 Hangers and Supports for Plumbing Piping and Equipment: Product Data, Manufacturer's Instructions
22 05 53 Identification for Plumbing Piping and Equipment: Product Data, Manufacturer's Instructions, Samples, Schedule
22 07 19 Plumbing Piping Insulation: Product Data, Manufacturer's Instructions

22 11 16 Domestic Water Piping: Product Data, Manufacturer's Instructions
22 11 19 Domestic Water Piping Specialties: Product Data, Manufacturer's Instructions
22 00 23 Facility Natural-Gas Piping: Product Data, Manufacturer's Instructions
22 13 16 Sanitary Waste and Vent Piping: Product Data, Manufacturer's Instructions
22 13 19 Sanitary Waste Piping Specialties: Product Data, Manufacturer's Instructions
22 14 13 Storm Drainage Piping: Product Data, Manufacturer's Instructions
22 14 23 Storm Drainage Piping Specialties: Product Data, Manufacturer's Instructions
22 15 13 General-Service Compressed-Air Piping: Product Data, Manufacturer's Instructions
22 15 19 General-Service Packed Air Compressors and Receivers: Product Data, Manufacturer's Instructions
22 16 16 Condensate Drain Piping: Product Data, Manufacturer's Instructions
22 34 00 Fuel-Fired, Domestic-Water Heaters: Product Data, Manufacturer's Instructions
22 42 23 Commercial Showers: Product Data, Manufacturer's Instructions
22 42 13.13 Commercial Water Closets: Product Data, Manufacturer's Instructions
22 42 13.16 Commercial Urinals: Product Data, Manufacturer's Instructions
22 42 16.13 Commercial Lavatories: Product Data, Manufacturer's Instructions
22 42 16.16 Commercial Sinks: Product Data, Manufacturer's Instructions
22 42 23 Commercial Showers: Product Data, Manufacturer's Instructions
23 05 00 Common Work results for HVAC: Product Data, Manufacturer's Instructions
23 05 16 Expansion Fittings and Loops for HVAC Piping: Product Data, Calculations, Certificates
23 05 19 Meters and Gages for HVAC: Product Data, Diagrams, Certifications, O&M
23 05 29 Hangers and Supports for HVAC Piping and Equip: Product Data, Shop Drawings, Certificates, Qualifications
23 05 48 Vibration and Seismic Controls for HVAC: Product Data, Drawings, Certificates, Qualifications
23 05 53 Identification for HVAC Piping and Equipment: Product Data, Schedules
23 05 93 Testing, Adjusting, and Balancing for HVAC: Qualifications, Certificates, Procedures, Reports
23 07 13 Duct Insulation: Product Data, Shop Drawings, Samples
23 07 19 HVAC Piping Insulation: Product Data, Shop Drawings
23 23 00 Refrigerant Piping: Shop Drawings, Reports
23 31 13 Metal Ducts: Product Data, Shop Drawings, Certificates, Reports
23 33 00 Air Duct Accessories: Product Data, Shop Drawings, Reports
23 34 23 HVAC Power Ventilators: Product Data Shop Drawings, Reports
23 37 13 Diffusers, Registers and Grilles: Product Data, Shop Drawings, Reports
23 54 00 Furnaces: Product Data, Shop Drawings, Warranty

23 81 26	Split-System Air-Conditioners: Product Data, Shop Drawings, Reports, Warranty
23 81 29	Variable Refrigerant Flow HVAC Systems: Product Data, Shop Drawings, Reports, Warranty
26 00 00	General Electrical Requirements
26 05 73	Overcurrent Protective Device Coordination Study: Product Data, Qualifications
26 24 13	Switchgear: Product Data, Shop Drawings
26 31 00	Packaged PV System: Product Data, Manufacturer's Instructions
26 32 13	Generator: Product Data, Shop Drawings
26 36 00	Automatic Transfer Switch: Product Data
27 05 23	Television Signal Distribution System: Product Data, Manufacturer's Instructions
27 13 43	Data Network and Network Wire/Cabling System: Product Data, Manufacturer's Instructions
27 51 30	Fire Station Alerting System: Product Data, Manufacturer's Instructions
28 31 00	Fire Alarm System: Product Data, Shop Drawings, Manuals, Certifications
31 00 00	Earthwork: Product Data, Manufacturer's Instructions
31 22 19	Finish Grading: Manufacturer's Data
31 23 33	Trenching and Backfilling: Manufacturer's Data, Shop Drawings
32 12 00	Asphalt Concrete Paving: Manufacturer's Data
32 16 00	Site Concrete: Manufacturer's Data
32 84 00	Irrigation: Schedules, Product Data, Manufacturer's Instructions
32 90 00	Planting: Product Data, Reports, Schedules
32 98 00	Operation and Maintenance of Planting: Instructions
33 00 00	Utilities: Manufacturer's Data
33 40 00	Stormwater Drainage Utilities: Manufacturer's Data