PROJECT MANUAL
Specifications for Construction

for

FIRE STATION 41
PROJECT

at

555 OBISPO ROAD, EL GRANADA, 94019
(ASSESSOR’S PARCEL NO. 047-261-030)

COASTSIDE FIRE PROTECTION DISTRICT

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

Advertisement Date: March 24, 2018
Bid Date: Monday, June 18, 2018 – Bid Opening at 9:00 A.M.
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DOCUMENT 00 1113
NOTICE INVITING BIDS

ARTICLE 1 INVITATION TO BID

1.01 Notice Inviting Bids: Owner will receive sealed Bids at Coastside Fire Protection District, located at 1191 Main Street, Half Moon Bay, California 94019 until 9:00 AM on Monday, June 18, 2018 for the following public work:

COASTSIDE FIRE PROTECTION DISTRICT

FIRE STATION 41

555 OBISPO ROAD, EL GRANADA, CA 94019

1.02 Project Description: The work under this contract shall include complete construction of Coastside Fire Protection District Fire Station #41 Project, including the Fire Station Living Quarters and Attached Apparatus Bay, miscellaneous structures, on-site utilities, paving, fire protection, mechanical, electrical and incidental related work.] Work shall be completed within 425 Days from the date when Contract Time commences to run.

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 District’s Headquarters, located at 1191 Main Street, Half Moon Bay, California 94019.

For online viewing, please go to http://www.coastsidefire.org/firestation41

Bidding Documents need not be returned to District. Bidder is responsible for printing any and all of Bidding Documents. Bidders may obtain hard copies of the Bidding Documents from the District’s Headquarters, subject to the District’s standard copying fees.

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 in the in the District Headquarters, located at 1191 Main Street, Half Moon Bay, California 94019. Attention: Assistant Chief, Paul Cole no later than the time and date set forth in Paragraph 1.01 above.

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

1.06 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.

1.07 Portion of Work to be Performed by Contractor: The successful bidder shall self-perform no less than 20% of the project. For purposes of this requirement, the bidder may consider all Work and costs included in the Total Bid Price as part of the project, such that a bidder shall satisfy the self-perform requirement if the total value of subcontracted work is no more than 80% of the Total Bid Price.

ARTICLE 2 LEGAL REQUIREMENTS

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

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: N/A

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

A. Non-substitutable items are identified as follows:

   1. Plymovent Vehicle Exhaust Extraction System

B. Owner has made a finding that the material(s), product(s), thing(s), or service(s) identified above by specific brand or trade name are required for use in the Project and may not be substituted for "or equal" items, for the following purpose(s):

   1. In order to match other products in use on a particular Owner project either completed or in the course of completion.

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, are on file at the District’s Headquarters, 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.

Dated: ________________  By: ____________________________________________

                                 Paul Cole
                                 Fire Chief
                                 Coastside Fire Protection District
                                 Half Moon Bay, California 944019

Published: ________________  ____________________________________________

                                 Clerk of the Board of Directors
                                 Coastside Fire Protection District
                                 Half Moon Bay, California 944019

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: 555 Obispo Road, El Granada, CA

PROJECT: Fire Station 41

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: ________________________________________________________  By: ________________________________________________________

Signature

Its: ___________________________________________________________  Its: __________________________________________________________

Title (If Corporation: Chairman, President or Vice President)  Title (If Corporation: Secretary, Assistant Secretary, Chief Financial Officer or Assistant Treasurer)
DOCUMENT 00 2113

INSTRUCTIONS TO BIDDERS

Bids 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 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. 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.

1.02 Bidder Questions and Answers
   A. Bidders must direct all questions about the meaning or intent of Bidding Documents to Architect: Jeff Katz Architecture, 280 Bettencourt Street, Sonoma, CA 95476, jeff@jeffkatzarchitecture.com in writing (via email). Interpretations or clarifications considered necessary by Owner in response to such questions will be issued by written Addenda posted to the District’s website. It is the bidders’ responsibility to continually check the website for any addenda. Owner may not answer questions received less than seven (7) 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.

1.03 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. Bidders must submit Bids in two envelopes: “Envelope A – Bid Submittals” and “Envelope B – Statement of Qualifications.” Envelopes shall be labeled accordingly.
   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. Document 00 4314 (Bidder Registration and Experience Form). Bidders must submit Document 00 4314 (Bidder Registration and Experience Form), completed in accordance with the provisions of Document 00 4314.

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.

2.04 Required Contents of “Envelope B – Statement of Qualifications”

A. Document 00 4513 (Statement of Qualifications for Construction Work). Bidder must submit Document 00 4513 (Statement of Qualifications for Construction Work) in accordance with the provisions of Document 00 4513.

ARTICLE 3 BID OPENING AND EVALUATION

3.01 Determination of Apparent Low Bidder

A. Owner will open each Bidders’ Envelope A submittal 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.

C. For the Apparent Low Bidder only, Owner will open Envelope B and evaluate the Apparent Low Bidder for responsiveness to the requirements of Document 00 4513 and for Responsibility.

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.

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.

G. Bids must specify that the bidder shall self-perform no less than 20% of the project. A bid shall satisfy the self-perform requirement if the total value of subcontracted work is no more than 80% of the Total Bid Price.

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, California 94019, before 3:30 P.M. of the fifth Business Day following the bid opening.

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 sixty (60) days after the opening of the Bid Proposals, unless there is a bid protest, then (90) days after the day of bid opening.

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 two 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 one original.

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 sixty (60) 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, are on file at the District's Headquarters and 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 the District's Authorized Representative, located at 1191 Main Street, Half Moon Bay, California 94019. Bidder or its duly authorized representative shall execute request to withdraw Bid.

6.06 Ineligible Contractors and Subcontractors:
A. Owner shall not accept a Bid from a Bidder 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 Bidder's SOQ (if bidder's Envelope B is opened), 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. All submissions not opened will remain sealed and shall be returned to the submitter. Except as otherwise require by law, Owner will not disclose trade secrets or proprietary financial information submitted by Bidders that has been designated as confidential by Bidder (including but not limited to the SOQ). 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 regarding this Bid, 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 SOQ and the attendant submissions 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.” Each bidder must submit their bid based on the specified items, unless the bidder proposes to use “or equal” item(s), submits the Substitution Request Form (Document 00 6325), and obtains written affirmation from the District that the substitute is acceptable prior to submitting the bid. 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. 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. Owner will provide each Bidder reasonable 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 41 at 555 Obispo Road, El Granada, CA 94019.

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:

<table>
<thead>
<tr>
<th>Addendum Number</th>
<th>ADDENDUM DATE</th>
<th>Signature of Bidder</th>
</tr>
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<tbody>
<tr>
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</table>

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

This project is to be bid as a lump sum. Bid items are described in Section 01 1100 (Summary of Work). Quote in figures only, unless words are specifically requested.

<table>
<thead>
<tr>
<th>ITEM</th>
<th>DESCRIPTION</th>
<th>ESTIMATED QUANTITY</th>
<th>TOTAL BID PRICE</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Fire Station 41</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Construction</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

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)
Fax Number(s):

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, 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 Fire Station 41 at 555 Obispo Road, El Granada,
CA 94019.

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
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: $ ________________________________

Bidder Registration Form

DOCUMENT 00 4314
BIDDER REGISTRATION FORM
A.M. Best Rating: 

**Automobile Liability:**

Carrier: ________________________________________________________________

Address: ______________________________________________________________

Phone and Fax: __________________________________________________________

Policy Number: __________________________________________________________

Policy Limits: $ __________________________________________________________

A.M. Best Rating: ________________________________________________________

**All-risk Course of Construction (if applicable, 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
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.

<table>
<thead>
<tr>
<th>Name of Subcontractor and Location of Place of Business</th>
<th>Description of Work</th>
<th>Subcontractor’s License No.</th>
<th>DIR Registration Number*</th>
<th>% of Total Bid</th>
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(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
STATEMENT OF QUALIFICATIONS FOR CONSTRUCTION WORK

ARTICLE 1 – GENERAL INFORMATION

1.01 Minimum Bidder Qualifications.
   A. Bidders must be duly licensed in accordance with the California Business & Professions Code and have a history of work performance sufficient to meet the requirements of a responsible bidder in the California Public Contract Code Section 1103.
   B. Bidders must have three (3) years’ experience as a continuously operating entity engaged in the performance of similar work.
   C. Bidders must demonstrate successful experience with type of work of this Project, to include work on a fire station(s) or similar public safety facility or facilities.

1.02 Measurement.
   A. Bidder’s compliance with the minimum qualification requirements will be measured by Bidder’s experience as an operating entity and also by the experience of the supervisory personnel who will have responsible charge of the various major components of the Work.
   B. If Bidder subcontracts portions of the Work, Owner, in its determination of whether the minimum qualification requirements have been met, may consider the qualifications of the Subcontractor’s supervisory personnel.
   C. The qualifications of the Key Personnel are to be submitted with the Statement of Qualifications (SOQ), by providing the information described in this Document.

ARTICLE 2 – REQUIRED CONTENTS OF SOQ SUBMISSION

2.01 Transmittal Letter.
   A. The Transmittal Letter shall name the proposed prime contractor, its legal structure (i.e., corporation, partnership, limited partnership, joint venture). If a joint venture or partnership is proposed, Bidder shall identify partner and/or member of the joint venture and their roles and responsibilities.

2.02 Submittals.
   A. Completed Questionnaires. Bidder shall include a completed Statement of Qualification Questionnaire in the form attached to this Document 00 4513 as Attachment A.
   B. Resumes of Proposed Key Personnel. Bidder shall provide a resume for each named Key Personnel of Bidder and any Designated Subcontractors, to include as necessary: Years of experience; Education - degrees, schools and years obtained; Professional Registrations; Fluency in English (Yes/No); At least two client references, including contact names, addresses and telephone numbers, and description of projects of a similar nature worked on in the past five years. Upon successful bid and execution of the Agreement, the Bidder/Contractor may only replace key personnel upon approval by Owner.
   C. Audited or Reviewed Financial Statements. Include audited or reviewed financial statements for the three most recently completed fiscal years for Bidder and each member of any proposed consorting or joint venture. Also include audited or reviewed financial statements for the three most recently completed fiscal years for any parent companies of Bidder and each member of any proposed consortium or joint venture.
   D. Surety Letter re: Capability to Provide Required Performance and Payment Bonds. Bidder shall include a letter from a surety duly licensed to do business in the State of California, having a financial rating from A.M. Best Company of [A-, VIII] or better, that the surety has agreed to provide Bidder with the required performance and payment bonds in accordance with the requirements set forth in Documents 00 6113.13 (Construction Performance Bond) and 00 6113.16 (Construction Labor and Material Payment Bond), each in the penal sum of the Contractor’s bid when submitted. Owner shall have the right to verify with the surety that the surety, based upon the Bid prices, will
issue the required bonds under the conditions stated.

E. **Insurer Letter re: Capability to Provide the Required Insurance.** Bidder shall provide a letter from an insurance underwriter, having a financial rating reasonably acceptable to Owner, confirming that the insurer will provide Bidder the required coverages and amounts specified in the Contract Documents.

F. **Description of Human and Physical Resources.** Bidder shall identify, describe, and quantify for itself, the following technical information for the construction work: Description and location of manufacturing facilities, naming products and quantifying production capacity and current demand; Description of field organization(s), naming skills and equipment; Description of safety program quality control procedures, and safety experience; and

G. **License:** Evidence of a valid contractor's license and required licenses of all licensees of persons who are Key Personnel necessary to perform the Work.

H. **Litigation History.** Description of litigation history for the past three years including names of involved parties, nature of dispute, and disposition.

### 2.03 Format.

A. The SOQ shall be clear and concise to enable management-oriented personnel to make a thorough evaluation and arrive at a sound determination as to whether the SOQ meet Owner's requirement. To this end, the SOQ should be so specific, detailed and complete as to demonstrate clearly and fully that the Bidder has a thorough understanding of and has demonstrated knowledge of the requirements to perform the Work (or applicable portion thereof).

B. Any explanation requested by a Bidder regarding the meaning or interpretation of this Document 00 4513 must be requested in writing and with sufficient time allowed for a reply to reach Bidder before the submission of its SOQ. Oral explanations or instructions will not be binding. Any information provided to any prospective Bidder concerning this Document 00 4513 will be furnished to all prospective Bidders as an Addendum to the Bidding Documents.

[STATEMENT OF QUALIFICATION QUESTIONNAIRE FOLLOWS ON NEXT PAGE]
ATTACHMENT A – Statement of Qualification Questionnaire

Bidders shall complete the entire Statement of Qualification Questionnaire and submit it in accordance with Document 00 2113 (Instructions to Bidders) and Document 00 4513 (Statement of Qualifications). Failure to complete the questionnaire or inclusion of any false statement(s) shall be ground for immediate disqualification.

CONTACT INFORMATION

Company Name: __________________________________________________________

Owner of Company: ______________________________________________________

Contact Person: __________________________________________________________

Address: __________________________________________________________________

Phone: ______________________ Fax: _____________________________

PART A: GENERAL INFORMATION

1. Does Bidder possess a valid and current California Contractor’s license for the work proposed? Yes ___ No ___

2. Does Bidder have a minimum of $5,000,000 liability insurance coverage? Yes ___ No ___

3. Has Bidder’s License been revoked at any time in the last five years? Yes ___ No ___

4. Has Bidder been “default terminated” by an Owner (other than for convenience), or has a Surety completed a contract for Bidder within the last five years? Yes ___ No ___

5. Has Bidder been convicted more than twice for failure to pay prevailing wages in the last three years? Yes ___ No ___

6. Has Bidder attached copies of its reviewed or audited financial statements and accompanying notes for the last three years? Yes ___ No ___

7. Are Bidder and all listed subcontractors registered and qualified with the Department of Industrial Relations pursuant to Labor Code Section 1725.5? Yes ___ No ___

Bidder may be disqualified if any answer to questions 1, 2, 6, or 7 is No. Bidder may be disqualified if any answer to questions 3, 4, or 5 is Yes.

PART B: SAFETY, PREVAILING WAGE, DISPUTES AND BONDS

(SAFETY)

1. Has Cal/OHSA, Federal OSHA, the EPA or any Air Quality Management Owner cited Bidder in the past five years? Yes ___ No ___ If yes, attach description of each citation.
2. How often does Bidder require documented safety meetings be held for:
   Field Supervisor  Weekly _____  Bi-Weekly _____  Monthly _____  Less Than Monthly _____
   Employees         Weekly _____  Bi-Weekly _____  Monthly _____  Less Than Monthly _____
   New Hires         Weekly _____  Bi-Weekly _____  Monthly _____  Less Than Monthly _____
   Subcontractors    Weekly _____  Bi-Weekly _____  Monthly _____  Less Than Monthly _____

3. How often does Bidder conduct documented safety inspections?
   Quarterly _____  Semi-annually _____  Annually _____  Other _____

4. Does Bidder have home office safety representatives who visit/audit the job site?
   Quarterly _____  Semi-annually _____  Annually _____  Other _____

5. What is Bidder’s Interstate Experience Modification Rate? ______________. (A rating in excess of 1 may constitute grounds for disqualification as non-responsible).

(PREVAILING WAGE PROVISIONS)

6. Has Bidder been fined, penalized or otherwise found to have violated any prevailing wage or labor code provision? If yes, attach description of each occurrence.
   Yes _____  No _____

(LICENSE PROVISIONS)

7. Has Bidder changed names or license numbers in the past 5 years? If so, please state reason for change.
   Yes _____  No _____  Reason:___________________________________________________________

(DISPUTES)

8. In the past five years, has Bidder on any project that Bidder performed construction services made any written claim against any owner for additional compensation or additional time, that the owner disputed, exceeding on a per project basis an aggregate amount of $100,000 or 10% of the original contract sum? If yes, attach description of each instance including details of total claim(s) amount, resolution description including amount, and Owner’s name and phone number.
   Yes _____  No _____

9. In the past five years, has any owner on any project that Bidder performed construction services asserted any written claim against Bidder for delay, defective work, warranty work, backcharges and/or offsets, that the Bidder disputed, exceeding on a per project basis, an aggregate amount of $100,000 or 10% of the original contract sum? If yes, attach description of each instance including details of total claim(s) amount, resolution description including amount, and Owner's name and phone number.
   Yes _____  No _____

(BONDING)

10. Bonding Capacity – Provide documentation from Bidder’s surety identifying the following:
    Name of bonding company/surety: ______________________________________________________
    Name of Surety Agent: __________________________________________________________________
    Surety Agent address: ___________________________________________________________________
Surety Agent phone number: _________________________________________________________

Is surety a California-admitted surety? Yes _____ No _____

Is surety listed in the current edition of the California Department of the Treasury’s Listing of approved sureties? Yes _____ No _____

List surety’s A.M. Best Rating: ______________________________________________

What is Bidder’s total bonding capacity? __________________________________________

What percent does Bidder pay for bonds? __________________________________________

PART C: EXPERIENCE OF PRIME CONTRACTOR

The nature of this Project requires prior similar experience for the firm and the Key Personnel assigned. Summarize similar project experience below and provide the detailed project information requested:

**Prime Contractor.** List three projects of similar size and scope to the Work of the Contract, completed in the past two (2) years, and indicate who were the superintendent, project manager and scheduler. NOTE: This listing will be used to assess compliance with the stated minimum qualifications in Paragraph 1.01.

<table>
<thead>
<tr>
<th>Project Name</th>
<th>Construction Cost ($)</th>
<th>Year Completed</th>
<th>Name of Project Superintendent</th>
<th>Name of Project Manager</th>
<th>Name of Project Scheduler</th>
<th>Name and Contact Information of Architect</th>
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Key Personnel.

List Key Personnel that will be assigned to the work of the current Project and their experience/training with the projects listed above:

Project Manager: _______________________________________________________________

Project Superintendent: __________________________________________________________

Project Scheduler: _______________________________________________________________

Recent Projects.

Provide information about three (3) of its most currently completed projects. Names and references must be current and verifiable. This listing will be used to assess compliance with the stated minimum qualifications in Paragraphs 1.01. If a separate sheet is used, it must contain all of the following information:

1. Project Name: _____________________________________________________________________

   Location: _________________________________________________________________________

   Owner: ___________________________________________________________________________

   Owner Contact (name and phone): __________________________________________________

   Architect/Engineer: _________________________________________________________________

   Architect/Engineer Contact (name and phone number): _________________________________

   Const. Mgr. or Project Mgr. (name and phone number): _________________________________

   Description of Project, Scope of Work Performed: _____________________________________

   Total Construction Cost: _____________________________________________________________

   Total Change Order Amount: _________________________________________________________

   Did Change Orders exceed 10% of original contract sum? __________ If yes, please explain on separate sheet.

   Original Scheduled Date of Completion: _____________________________________________
Time Extensions Granted (number of Days): _____________________________________________

Actual Date of Completion: _________________________________________________________

Number of Stop Notices filed by Subcontractors or Suppliers: ____________________________

2. Project Name: ___________________________________________________________________
   Location: _________________________________________________________________________
   Owner: __________________________________________________________________________
   Owner Contact (name and phone): __________________________________________________
   Architect/Engineer: _________________________________________________________________
   Architect/Engineer Contact (name and phone number): _________________________________
   Const. Mgr. Or Project Mgr. (name and phone number): ________________________________
   Description of Project, Scope of Work Performed: ____________________________________
   ______________________________________________________________________________
   Total Construction Cost: ____________________________________________________________
   Total Change Order Amount: ________________________________________________________
   Did Change Orders exceed 10% of original contract sum? ___________ If yes, please explain on
   separate sheet.
   Original Scheduled Date of Completion: _____________________________________________
   Time Extensions Granted (number of Days): __________________________________________
   Actual Date of Completion: _________________________________________________________
   Number of Stop Notices filed by Subcontractors or Suppliers: ____________________________

3. Project Name: ___________________________________________________________________
   Location: _________________________________________________________________________
   Owner: __________________________________________________________________________
   Owner Contact (name and phone): __________________________________________________
   Architect/Engineer: _________________________________________________________________
   Architect/Engineer Contact (name and phone number): _________________________________
   Const. Mgr. Or Project Mgr. (name and phone number): ________________________________
   Description of Project, Scope of Work Performed: ____________________________________
   ______________________________________________________________________________
PART D: OMITTED

PART E: FINANCIAL INFORMATION

1. Has Bidder ever reorganized under the protection of bankruptcy laws? Yes _____ No _____ If yes, please state when ________________

2. If Bidder has had the general liability carrier identified in Document 00 4314 (Bidder Registration and Safety Experience Form) for less than 5 years, please provide additional information below for balance of the last 5 years:

   Agency Name: __________________________________________
   Contact Name: __________________________________________
   Phone Number __________________________________________
   Carrier: _______________________________________________ A.M. Best Rating: ________________________
   Carrier: _______________________________________________ A.M. Best Rating: ________________________
   Carrier: _______________________________________________ A.M. Best Rating: ________________________

3. Has Bidder ever had insurance terminated by a carrier? Yes _____ No _____
   If yes, explain on a separate signed sheet marked with correlating cross-reference to this paragraph of the questionnaire.

Bidder hereby declares under penalty of perjury that all the information provided in this questionnaire is true and correct.

____________________________________________________
SIGNATURE

____________________________________________________
TITLE

END OF DOCUMENT

Statement of Qualifications
OAK #4836-6479-4911 v1
06660-0002
Oct 2014
DOCUMENT 00 4519

NON-COLLUSION AFFIDAVIT

PUBLIC CONTRACT CODE §7106

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

STATE OF CALIFORNIA )  
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 ____________________________, 201__

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 venture 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: ______________________, [201 ]  By:______________________________________________________________
(Signature)

Name:______________________________________________________________
(Print Name)

Its:______________________________________________________________
(Title)

END OF DOCUMENT
DOCUMENT 00 5100
NOTICE OF AWARD

Dated ______________________________

TO: ________________________________

ADDRESS: ____________________________

CONTRACT NO.: ______________________________

CONTRACT FOR: COASTSIDE FIRE PROTECTION DISTRICT
Fire Station 41 AT 555 Obispo Road, El Granada, CA 94019

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

Dollars ($ __________________________) 

1. Two 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 one originals of Document 00 6113.13 (Construction Performance Bond), executed by you and your surety.

   c. Deliver to Owner one 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) with one copy of the Project Manual (including Specifications and Drawings) and one set of full-size Drawings.

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 Jeff Katz, (619) 698-9177. Questions regarding bonds and insurance may be directed to Kai Ruess, (650) 593-3117 ext. 215. All other inquiries regarding the Project should be directed to Jeff Katz, (619) 698-9177.
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: ______________________, [201__]

[Copy of Resolution Attached]
DOCUMENT 00 5200

AGREEMENT

THIS AGREEMENT, dated this [date] day of [Month], [201__], by and between [Enter Name of Contractor] whose place of business is located at [Address of Contractor] (Contractor), and COASTSIDE FIRE PROTECTION DISTRICT (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 41
at
555 Obispo Road
El Granada, CA 94019

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]

COMMENCEMENT AND COMPLETION OF WORK

1.03 Commencement of Work

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

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

1.04 Completion of Work

A. Contractor shall achieve Substantial Completion of the entire Work within [_____] Days from the Commencement Date.

B. Contractor shall achieve Final Completion of the entire Work [_____] Days from the Commencement Date.

ARTICLE 2 PROJECT REPRESENTATIVES

2.01 Owner's Project Manager

A. Owner has designated [_________] as its 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:

<table>
<thead>
<tr>
<th>Name</th>
<th>Position</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Superintendent [See Doc. 00 7200 Para. 8.01.B]</td>
</tr>
</tbody>
</table>

2.03 Architect/Engineer

A. Jeff Katz Architecture (JKA) furnished the Plans and Specifications and shall have the rights assigned to Architect/Engineer in the Contract Documents.

B. Architect/Engineer has designated Jeff Katz 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 five hundred dollars ($500.00) 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 five hundred dollars ($500.00) 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:

<table>
<thead>
<tr>
<th>Document 00 5100</th>
<th>Notice of Award</th>
</tr>
</thead>
<tbody>
<tr>
<td>Document 00 5200</td>
<td>Agreement</td>
</tr>
<tr>
<td>Document 00 5500</td>
<td>Notice to Proceed</td>
</tr>
</tbody>
</table>
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, are on file at the District’s Headquarters, 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 duplicate the day and year first above written.

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)

OWNER: COASTSIDE FIRE PROTECTION DISTRICT

By: ______________________________ (Signature)

________________________________
(Print Name)

________________________________
(Title)

Attest: ______________________________
   Secretary

________________________________
(Print Name)

APPROVED AS TO FORM AND LEGALITY

THIS ___ DAY OF _____, [201__]

By: ______________________________

Agreement 00 5200 - 4

OAK #4838-8204-7263 v1
06660-0002
Oct 2014
Attorney for Owner

________________________________________
(Print Name)

RESOLUTION NO. __________________________

END OF DOCUMENT
DOCUMENT 00 5500
NOTICE TO PROCEED

Dated: ______________________, 201__

To: ____________________________________________
   (Contractor)

Address: ___________________________________________________________________

CONTRACT FOR: COASTSIDE FIRE PROTECTION DISTRICT
   Fire Station 41 at 555 Obispo Road, El Granada, CA 94019

You are notified that the Contract Time under the above Contract will commence to run on [201__]. 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 ______________ , [201__] and ______________, [201__], respectively (___ calendar days from Month Day, Year).

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

OWNER: COASTSIDE FIRE PROTECTION DISTRICT

By: _______________________________(District Staff Signature)

Its: ________________________________(Name and Title)

END OF DOCUMENT
CONSTRUCTION PERFORMANCE BOND

THIS CONSTRUCTION PERFORMANCE BOND (Bond) is dated [______________], 2018, is in the amount of [______________] (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 [______________] (Contractor), [______________] (Surety), Coastside Fire Protection District (Owner), or other party shall be considered plural where applicable.

CONTRACTOR:  

Name of Contractor: ____________________________  

Name of Surety: ____________________________  

Address: ____________________________  

Principal Place of Business: ____________________________  

City/State/Zip: ____________________________  

City/State/Zip: ____________________________  

CONSTRUCTION CONTRACT: Agreement for the Fire Station 41 Project, located at the 555 Obispo Road Road, El Granada, California, dated [Month, Day], 2018, in the amount of [______________].

CONTRACTOR AS PRINCIPAL  

Company: (Corp. Seal)  

Signature: ____________________________  

Name: ____________________________  

Title: ____________________________  

SURETY  

Company: (Corp. Seal)  

Signature: ____________________________  

Name: ____________________________  

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, the Contract dated the __________ day of __________, 2018 (the Contract), titled THE FIRE STATION 41 PROJECT in the amount of $______________, which Contract is by this reference made a part hereof, for the work of the following Contract:

Full construction of Fire Station 41.

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.
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 [blank] day of [blank] 2018.

CONTRACTOR AS PRINCIPAL

Company: (Corp. Seal)

Signature

Name

Title

Street Address

City, State, Zip Code

SURETY

Company: (Corp. Seal)

Signature

Name

Title

Street Address

City, State, Zip Code
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 __________________, 2018, 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 THE FIRE STATION 41 PROJECT located at 555 Obispo Road, El Granada, California in the amount of $__________ dated __________, 2018 (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:**

<table>
<thead>
<tr>
<th>Title</th>
<th>Name</th>
<th>Signature</th>
<th>Address</th>
<th>City/State/Zip Code</th>
</tr>
</thead>
</table>

**ON BEHALF OF CONTRACTOR:**

<table>
<thead>
<tr>
<th>Title</th>
<th>Name</th>
<th>Signature</th>
<th>Address</th>
<th>City/State/Zip Code</th>
</tr>
</thead>
</table>

**ON BEHALF OF ESCROW AGENT:**

<table>
<thead>
<tr>
<th>Title</th>
<th>Name</th>
<th>Signature</th>
<th>Address</th>
<th>City/State/Zip Code</th>
</tr>
</thead>
</table>

IN WITNESS WHEREOF, the parties have executed this Escrow Agreement by their proper officers on the date first set forth above.
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.
To: COASTSIDE FIRE PROTECTION DISTRICT, Owner

Architect: Jeff Katz Architecture, jeff@jeffkatzarchitecture.com

**PROJECT: FIRE STATION 41 PROJECT**

<table>
<thead>
<tr>
<th>Transmittal Record</th>
<th>Attn:</th>
<th>Firm:</th>
<th>Date Sent:</th>
<th>Date Rec’d:</th>
<th>Date Due:</th>
</tr>
</thead>
<tbody>
<tr>
<td>Contractor to Owner</td>
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<tr>
<td>Contractor to Architect</td>
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<tr>
<td>Owner / Architect to Consultant</td>
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<tr>
<td>Architect to Owner Representative</td>
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<tr>
<td>Owner Representative to Contractor</td>
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</tbody>
</table>

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

<table>
<thead>
<tr>
<th>Section / Drawing</th>
<th>Article</th>
<th>Specified Item</th>
</tr>
</thead>
</table>

**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

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

Remarks:______________________________

By:______________________________

By:______________________________
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], [201], 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 (the "Contract") for construction of Owner’s Fire Station 41 Project located at 555 Obispo Road, El Granada, 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:

<table>
<thead>
<tr>
<th>Description</th>
<th>Amount</th>
</tr>
</thead>
<tbody>
<tr>
<td>Original Contract Sum</td>
<td>$</td>
</tr>
<tr>
<td>Modified Contract Sum</td>
<td>$</td>
</tr>
<tr>
<td>Payment to Date</td>
<td>$</td>
</tr>
<tr>
<td>Liquidated Damages</td>
<td>$</td>
</tr>
<tr>
<td>Payment Due Contractor</td>
<td>$</td>
</tr>
</tbody>
</table>

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.

Agreement and Release of All Claims 00 6530 - 1
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Oct 2014
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 * * *

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: ___________________________, [201_]

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 41 PROJECT, located at 555 Obispo Road, El Granada, 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. Contractor and Architect shall inspect the project one month prior to end of guaranty period to verify any items of work which are to be corrected before the end of 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

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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
2. Progress Schedule, and
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), 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

Unless expressly provided otherwise in the Contract Documents, Contractor shall provide all temporary utilities (including without limitation electricity, water, 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.

I. COSTS FOR TESTING: The cost of all testing will be borne by the District, except in the following instances: (1) The specifications for a specific project provide for Contractor furnished testing (i.e., up to the stated number of tests); (2) The Contractor shall assume all costs of retesting materials which fail to meet Contract requirements. Any costs due from the Contractor for testing will be charged against the Contract and deducted from monies due, or to become due, to the Contractor.

J. TESTING BY CONTRACTOR

1. Where these specifications require the Contractor to furnish test results, they shall be performed by an independent testing laboratory approved by the District.
2. Laboratory test reports shall cite the contract requirements, the test of analysis procedures used, the actual test results, and include a statement that the item tested conforms or fails to conform to the specification requirements.

3. All test reports shall be signed by a representative of the testing laboratory authorized to sign certified test reports.

4. Original copies of test reports shall be mailed directly to the District from the approved testing laboratory.

K. COST OF OVERTIME CONSTRUCTION INSPECTION: Overtime construction work performed at the option of, or for the convenience of, the Contractor will be inspected by the District at the expense of the Contractor. For any such overtime beyond the regular 8-hour day and for any time worked on Saturday, Sunday, or holidays, the charges for District personnel will be as shown in the currently adopted rate schedule, available at the Public Works office. There will be no charges for the inspection of overtime work ordered by the Engineer.

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 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.

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.

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
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 in San Mateo, California or that 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
   COOP station located in Half Moon Bay, California or that 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.

Normal number of rain days for which rainfall has exceeded 0.1 inches in Half Moon Bay, CA is as
follows:

<table>
<thead>
<tr>
<th>Month</th>
<th>Jan</th>
<th>Feb</th>
<th>Mar</th>
<th>April</th>
<th>May</th>
<th>June</th>
<th>July</th>
<th>Aug</th>
<th>Sept</th>
<th>Oct</th>
<th>Nov</th>
<th>Dec</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>8</td>
<td>8</td>
<td>7</td>
<td>4</td>
<td>2</td>
<td>1</td>
<td>0</td>
<td>0</td>
<td>1</td>
<td>3</td>
<td>5</td>
<td>7</td>
</tr>
</tbody>
</table>

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 Contractor’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’s excavation 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;

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.

14.10 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 indemnitees 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.

14.11 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.

14.12 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.
14.13 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

A. 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.

B. 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.

C. 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.

D. 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

A. 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.

B. 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.

C. 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.

D. 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.

E. 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.

F. Work within the right-of-way lines of the city and/or Owner 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

A. 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.

B. 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.

C. 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

A. 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

A. 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

A. 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

A. 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.

B. 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.

C. 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.

D. 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.

E. 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.
F. 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 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

A. 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

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

B. 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.

C. 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.

D. 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
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 (excluding Workers Compensation insurance with respect to Paragraph A below):

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. Insurance shall contain a provision requiring the insurance carriers to waive their rights of subrogation against Owner and all additional insureds, as well as other insurance carriers for the Work.

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

F. 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
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
The following Addenda were issued, modifying the Project Manual:

Addendum No. 1, issued on [date]
Addendum No. 2, issued on [date]

(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 41 Project located at 555 Obispo Road, El Granada, California. The Work includes, without limitation, full construction of Fire Station 41. 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.

E. Portion of Work to be Performed by Contractor: The Prime Contractor shall self-perform no less than 20% of the Work described in the Contract Documents.
1.03 **Bid Items, Allowances and Alternates.**

A. Descriptions of Lump Sum Items (listed by Bid item numbers):
   
   1. Fire Station 41 Construction

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: (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).

1.11 **Partial Occupancy/Utilization Requirements: (N/A)**

1.12 **Contractor Use of Site.**

A. Access is available to the Site from Obispo Road. Contractor shall be responsible for securing site and maintaining proper access.

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 District 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. See Section 01050, Field Engineering

B. 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.

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

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 available for review. This information is not part of the Contract Documents.

   1. **Geotechnical Investigation**
      Coastside Fire Station 41
      prepared by Geocon, Inc.
      August 15, 2016

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. 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.

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

G. 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. 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, and loss of use of Station 41, resulting from Contractor’s failure to comply with all applicable permit conditions and legal or regulatory requirements.

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.

PART 3 EXECUTION – NOT USED

END OF SECTION
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 – None
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. Each such scheduled Work item and/or activity shall also list sub-value items which do not exceed $20,000.00 in cost estimate, unless approved by the Architect. Regardless of cost estimate, the following trades shall be broken into sub-value items:

   a. Concrete: Site paving, Retaining walls and building
   b. HVAC: Rough-in and finish.
   c. Plumbing: Rough-in and finish.
   d. Electrical: Site electrical, Standby Generator, Rough-in and finish.

This breakdown of Work items and/or activities and their associated sub-value items with cost estimates 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
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 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.
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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 Contract 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 10%.
2. When extra Work is performed by Subcontractors, regardless of the number of tiers, total Markup on Component 1 Direct Costs shall be 15%. Contractor and its Subcontractors shall divide the 15% as they may agree.
3. Under no circumstances shall the total Markup on any extra Work exceed 15%, 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 District 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).

PART 2 – PRODUCTS – NOT USED

PART 3 – EXECUTION – NOT USED

END OF SECTION
[COST PROPOSAL FORM FOLLOWS ON NEXT PAGE]
COST PROPOSAL FORM

FIRE STATION 41 PROJECT

To: COASTSIDE FIRE PROTECTION DISTRICT
Attention: Fire Chief
1191 Main Street, Half Moon Bay, CA 94019
Phone: (650) 726-5213
Fax: (650) 726-0132

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):

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(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. Contractor 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. Contractor’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. Contractor 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
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 within 10 days after the Notice To Proceed date. 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 or bar chart if owner agrees in writing. 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 of each Submittal by the project Architect or other agent of the Owner, 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.

PART 2 – PRODUCTS – NOT USED

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.

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 (2016 Edition or latest applicable code) as amended by applicable local ordinances for all construction work.
b. California Electrical Code (2016 Edition or latest applicable code) as amended by applicable local ordinances for all construction work.

c. California Plumbing Code (2016 Edition or latest applicable code) as amended by applicable local ordinances for plumbing, sewage disposal and health requirements.

d. California Mechanical Code (2016 Edition or latest applicable code) as amended by applicable local ordinances for all construction work.

e. California Fire Code (2016 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 District and County Ordinances, rules of the State or District 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. Federal:
   1) Americans With Disabilities Act of 1990, as updated
   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. State of California:
   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. State of California Agencies:
   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)
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 the District 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:

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.


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. Presidents' Day, third Monday in February;
   d. Memorial Day, last Monday in May;
   e. Independence Day, July 4;
   f. Labor Day, first Monday in September;
   g. Veterans' Day, November 11;
   h. Thanksgiving Day, as designated by the President;
   i. The Day following Thanksgiving Day;
   j. Christmas Eve Day, December 24;
   k. Christmas Day, December 25; and

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.


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.


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**
TECHNICAL SPECIFICATIONS

FOR

COASTSIDE FIRE PROTECTION DISTRICT
COASTSIDE FIRE STATION #41
EL GRANADA, CALIFORNIA

MAY 24, 2018

FOR BID

Prepared By:
Jeff Katz Architecture
280 Bettencourt Street
Sonoma, CA 95476
619.698.9177
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Water System Specifications for Obispo Road Pipeline Extension Project
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PART 1 - GENERAL

1.01 SUMMARY

A. Contractor shall engage services of a Surveyor to establish all grades, lines and levels, and as follows:

1. Each separate Subcontractor shall be responsible for layout of his own Work from grades, lines and levels established by Contractor.

B. Payment for Survey work performed by the contractor shall be considered to be included in the contract lump sum price paid for Construction and no additional allowance shall be made therefore.

1.02 RELATED WORK SPECIFIED ELSEWHERE

A. Applicable Sections: Division 1.

B. Project Closeout: Division 1.

C. Project Record Documents: Division 1.

1.03 SUBMITTALS

A. Submit per the requirements of Division 1.

B. Name, Address, and Telephone Number of Surveyor: Prior to starting surveyor work.

C. Documentation Verifying Accuracy of Survey Work: Upon request.

D. Reference Point Survey: Including field notes for record.

E. Certification: Signed and sealed by Surveyor showing that elevations and locations of all improvements are or are not in conformance with Contract Documents.

F. Record Documents: Under provisions of Division 1.

1.04 QUALITY CONTROL

A. Surveyor: Licensed in State of California.

1.05 PROJECT RECORD DOCUMENTS

A. Maintain complete, accurate log of control and survey work as it progresses.

B. Record on Project Record Documents all pertinent information under provisions of Division 1.

C. On completion of foundation walls and major Project Site improvements, prepare a certified survey showing dimension, locations, angles and elevations of construction and project site work.

D. Submit project record documents as specified.
PART 2 - PRODUCTS

Not used.

PART 3 - EXECUTION

3.01 EXECUTION

A. Verify locations of survey control points prior to starting Work. Promptly notify Architect of any discrepancies discovered.

3.02 SURVEY REFERENCE POINTS

A. Project survey control points prior to starting Project Site work; preserve permanent reference points during construction. Make no changes without prior written notice to Architect.

B. Promptly report to Architect the destruction of any reference point or relocation required because of changed in grades or other reasons. Replace dislocated survey control points based on original survey control.

3.03 SURVEY REQUIREMENTS

A. Use instruments to establish a minimum of two (2) permanent benchmarks on Project Site. Reference benchmarks to data established by survey control points. Record benchmark locations with horizontal and vertical data for Project Record Documents. Reference these benchmarks to finished floor lines and grades. Provide accurate alignment and level of Work, and correct slope and curvatures as required.

B. Periodically verify layouts and elevations by same means. No extra charges will be allowed for differences between dimensions and elevations shown and actual measurements. Advise the Architect of any differences. Do not provide filler pieces or closures without approval of the Architect.

C. Prepare Project Record Documents of grading, layout and Project Site utility plan showing final installation of all Project Site improvements and utilities, including storm water, sanitary, water, gas and electric lines for permanent record.

3.04 SETTLEMENT SURVEY

A. Prior to start of construction operations, fix elevation targets to surrounding buildings. Targets shall be located minimum at each corner of building and maximum 100 feet on center.

B. Perform surveys to determine elevation of targets in relation to benchmarks which shall not be disturbed by construction.

END OF SECTION
SECTION 01351
SUSTAINABILITY (CALGREEN) REQUIREMENTS

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 1 Specification Sections, apply to this Section.

1.02 SUMMARY

A. This Section includes general requirements and procedures for compliance with certain California Green Building Standards Code. The California Green Building Code is Part 11 of twelve parts of the official compilation and publication of the adoption, amendment and repeal of the building regulations to the California Code of Regulations, Title 24, also referred to as the California Building Standards Code.

1. This code contains both mandatory and voluntary green building measures. Mandatory and voluntary measures are identified in the appropriate application checklist contained in this code. Mandatory measures as outlined in the California Green Building Standards Code are a requirement of this contract. Voluntary measures are not required as a part of this contract.

2. Voluntary Tier 1 and Tier 2 measures are not required as part of the scope of work of this contract.

B. Related Sections include the following:

1. Divisions 1 through 16 Sections for CalGreen requirements specific to the Work of each of those Sections. These requirements may or may not include reference to CalGreen.

1.03 DEFINITIONS

A. CalGreen: California Green Building Standards Code

B. Recycled Content: The percentage by weight of constituents that have been recovered or otherwise diverted from the solid waste stream, either during the manufacturing process (pre-consumer), or after consumer use (post-consumer).

1. Spills and scraps from the original manufacturing process that are combined with other constituents after a minimal amount of reprocessing for use in further production of the same product are not recycled materials.

2. Discarded materials from one manufacturing process that are used as constituents in another manufacturing process are pre-consumer recycled materials.

C. Building Commissioning: A systematic quality assurance process that spans the entire design and construction process, including verifying and documenting that building systems and components are planned, designed, installed, tested, operated and maintained to meet the owner’s project requirements.

1.04 SUBMITTALS
A. General: Comply with additional CalGreen submittal requirements included in other sections of the Specifications.

B. Cal Green submittals are in addition to other submittals. If submitted item is identical to that submitted to comply with other requirements, the single set of copies to verify compliance with indicated CalGreen requirements is acceptable unless noted otherwise.

C. Verification: Documentation of conformance for applicable green building measures shall be provided to the enforcing agency. Alternate methods of documentation shall be acceptable when the enforcing agency finds that the proposed alternate documentation is satisfactory to demonstrate substantial conformance with the intent of the proposed green building measure.

D. Cal Green Documentation required: Provide preliminary submittals within seven days of date established for commencement of the Work indicating how the following requirements will be met.

1. 5.106.1 Storm Water Pollution Prevention plan

2. 5.408.1 Construction waste diversion: Establish a construction waste management plan for the diverted materials that meets or exceeds the local construction and demolition waste management ordinance, whichever is more stringent.

3. 5.408.3 Provide plan to incorporate construction waste reduction of at least 75%.

4. 5.410.2.3 Commissioning plan shall be provided by the Owner.

PART 2 - EXECUTION

2.01 PLANNING AND DESIGN

A. Section 5.106

1. Develop Storm Water Pollution Prevention Plan for implementation and maintenance onsite throughout the construction process.

2. Bicycle parking is to comply with Sections 5.106.4.1 and 5.106.4.2 or local ordinance, whichever is more stringent.

3. If the project is anticipated to generate visitor traffic, provide permanently anchored bicycle racks within 200 feet of the visitors’ entrance, readily visible to passers-by, for 5% of visitor motorized vehicle parking capacity, with a minimum of one two-bike capacity rack.

4. Meet lighting power requirements in the California Energy Code, CCR, Title 24, Part 6, and design interior and exterior lighting such that zero direct-beam illumination leaves the building site. Comply with zones 1-4 and lighting zone characteristics as defined in Chapter 10 of the California Administrative Code, CCR, Title 24, Part 1 using the following strategies:

a. Shield all exterior luminaires or provide cutoff luminaires per Section 132 (b) of the California Energy Code.

b. Contain interior lighting within each source.

c. Allow no more than .01 horizontal foot-candles to escape 15 feet beyond the site.
2.02 ENERGY EFFICIENCY

A. Section 5.201.1

1. Comply with aforementioned section.

2.03 WATER EFFICIENCY AND CONSERVATION

A. Section 5.303

1. Separate meters or metering devices shall be installed for the uses described in Sections 503.1.1 and 503.1.2.

2. Plumbing fixtures and fixture fittings are required to reduce the overall use of potable water by 20%. This reduction shall be based on the maximum allowable water use per the plumbing fixture and fittings as required by the California Building Standards code.

B. Section 5.304

1. Automatic irrigation system controllers installed at time of final inspection shall comply with the following:

   a. Controllers shall be weather or soil moisture-based controllers that automatically adjust irrigation in response to changes in plants' needs as weather conditions change.

   b. Weather-based controllers without integral rain sensors or communication systems that account for local rainfall shall have a separate wired or wireless rain sensor which connects or communicates with the controller(s). Soil moisture-based controllers are not required to have a rain sensor input.

2.04 MATERIAL CONSERVATION AND RESOURCE EFFICIENCY

A. Section 5.408

1. Establish a construction waste management plan for the diverted materials, or meet local construction and demolition waste management ordinance, whichever is more stringent.

2. Documentation is required to be provided to the enforcing agency which demonstrates compliance with Section 5.408.2, items 1-4. The waste management plan shall be updated as necessary and shall be accessible during construction for examination by the enforcing agency.

3. Recycle and/or salvage for reuse a minimum of 50 percent of the non-hazardous construction and demolition debris, or meet a local construction and demolition waste management ordinance, whichever is more stringent. Calculations are required of materials diverted by weight or volume, but not both.

4. 100 percent of trees, stumps, rocks, and associated vegetation and soils resulting primarily from land clearing shall be reused or recycled. For a phased project, such material may be
B. Section 5.410

1. For new buildings 10,000 sf and over, building commissioning shall be included in the design and construction processes of the building project to verify that the building systems and components meet the owner's or owner representative's project requirements. Commissioning shall be performed in accordance with this section by trained personnel with experience on projects of comparable size and complexity. Commissioning requirements shall include the following:

   a. Owner's or owner representative's project requirements

   b. Basis of Design

   c. Commissioning measures shown in the construction documents

   d. Commissioning plan

   e. Functional performance testing

   f. Documentation and training

   g. Commissioning report

2. Testing and adjusting of systems shall be required for buildings less than 10,000 sf.

   a. Operation and maintenance (O&M Manuals) are to be provided to the building owner or representative with detailed operating and maintenance instructions and copies of guaranties/warranties for each system. O&M instructions shall be consistent with OSHA requirements in CCR, Title 8, Section 5142, and other related regulations.

      i. Include a copy of all inspection verifications and reports required by the enforcing agency.

2.05 ENVIRONMENTAL QUALITY

A. Section 5.504:

1. Covering of duct openings and protection of mechanical equipment during construction is required per section 5.504.3.

2. Finish materials must comply with tables 5.504.4.1 through 5.504.4.4.

3. Adhesives, sealants, and caulks must comply with local or regional air pollution control or air quality management district rules where applicable, or SCAQMD Rule 1168 VOC limits as indicated in tables 5.504.4.1 and 5.504.4.2. Aerosol adhesives shall comply with statewide VOC standards and other requirements, including prohibitions on use of certain toxic compounds, of California Code of Regulations, Title 17, commencing with Section 94507.

4. Paints and coatings shall comply with the VOC limits in Table 1 of the ARB Architectural Coatings Suggested Control Measure, shown in Table 5.504.4.3, unless more stringent local limits apply. Aerosol paints and coatings shall meet the PWMIR Limits for ROC in Section
94522(a)(3) and other requirements as described in code section 5.504.4.3.1.

5. Verification of compliance of this section shall be provided including (1) Manufacturer's product specification and (2) Field verification of on-site product containers.

6. All carpet installed in the building interior shall meet the testing and product requirements of one of the following:
   b. California Department of Public Health Standard Practice for the testing of VOC’s (Specification 01350)
   c. NSF/ANSI 140 at the Gold Level
   d. Scientific Certifications Systems Sustainable Choice

7. All carpet cushion installed in the building interior shall meet the requirements of the Carpet and Rug Institute Green Label program.

8. All carpet adhesive shall meet the requirements of Table 5.504.4.1.

9. Hardwood plywood, particleboard, and medium density fiberboard composite wood products used on the interior or exterior of the building shall meet the requirements for formaldehyde as specified in ARB's Air Toxics Control Measure for Composite Wood (17 CCR 93120 et seq), buy or before the dates specified in those sections, as shown in Table 5.504.4.5.

10. Verification of compliance of this section shall be provided. Documentation shall include at least the following:
    a. Product certifications and specifications
    b. Chain of custody certifications
    c. Other methods acceptable to the enforcing agency

11. For 50% of the floor area receiving resilient flooring, install resilient flooring complying with the VOC-emission limits defined in the 2009 Collaborative for High Performance Schools (CHPS) criteria and listed on its Low-emitting Materials List (or product registry) or certified under the Resilient Floor Covering Institute (RFCI) FloorScore program.

12. Verification of compliance shall be provided with documentation indicating that the resilient flooring materials meet the pollutant emission limits.

13. In mechanically ventilated buildings, provide regularly occupied areas of the building with air filtration media for outside and return air prior to occupancy that provides at least a MERV of 8. Replace all filtration media immediately prior to occupancy.

14. Where outdoor areas are provided for smoking, prohibit smoking within 25 feet of building entries, outdoor intakes, and operable windows and in buildings. Signage to be posted to inform building occupants if no ordinances are in place.

B. Section 5.505:
1. Buildings shall meet or exceed the provisions of California Building Code, CCR, Title 24, Part 2, Sections 1203 (Ventilation) and Chapter 14 (Exterior Walls). For additional measures not applicable to low-rise residential occupancies, see Section 5.407.2 of the Cal Green code.

2. For mechanically or naturally ventilated spaces in buildings, meet the minimum requirements of Section 121 (Requirements for Ventilation) of the California Energy Code, CCR, Title 24, Part 6, or the applicable local code, whichever is more stringent, and Chapter 4 of CCR, Title 8.

3. For buildings equipped with demand control ventilation, carbon dioxide sensors and ventilation controls shall be specified and installed in accordance with the requirements of the current edition of the California Energy Code, CCR, Title 24, Part 6, Section 121(c).

C. Section 5.507:

1. Employ building assemblies and components with Sound Transmission Coefficient (STC) values determined in accordance with ASTM E90 and ASTM E 413.

   a. Wall and roof-ceiling assemblies making up the building envelope shall have an STC of at least 50, and exterior windows shall have a minimum STC of 30 for any of the following locations: (1) Within 1000 ft. of right of ways of freeways, (2) Within 5 mi. of airports serving more than 10,000 commercial jets per year, (3) Where sound levels at the property line regularly exceed 65 decibels, other than occasional sound due to church bells, train horns, emergency vehicles, and public warning systems.

   b. Wall and floor-ceiling assemblies separating tenant spaces and tenant spaces and public spaces shall have an STC of at least 40.

D. Section 5.508:

1. Installations of HVAC, refrigeration and fire suppression equipment shall not contain CFC's nor halon.

END OF SECTION
SECTION 01352
CONSTRUCTION INDOOR AIR QUALITY MANAGEMENT

PART 1 – GENERAL

1.01 SUMMARY

A. The Contractor shall provide all necessary equipment and material resources required to meet the requirements of this section.

B. Related Sections:

1. Section 01480 - Environmental Protection

1.02 SUBMITTALS

A. The Contractor shall provide the following documentation:

1. Construction Indoor Quality Management Plan:

   a. The Plan shall identify the five SMACNA IAQ requirements for Occupied Buildings under Construction, 2008, Chapters 3 and 4.

      1) Part 3.01 of this Section, Indoor Air Quality Plan during Construction, can be used as a basis for development of the plan.

   b. Provide a draft of the plan prior to the start of building construction.

   c. Provide a final version of the Construction IAQ Management Plan after completing the requirements of this section.

      1) The final Plan must be revised to reflect the actual as-built conditions of this project.

2. Construction Indoor Air Quality Procedures Photographs:

   a. Provide photographs of construction IAQ management measures such as protection of ducts and on-site stored or installed absorptive materials.

   b. Photographs shall be taken on at least three different occasions during the interior finish work:

      1) The first two to four weeks of the work.

      2) The middle two to four weeks of the work.

      3) The last two to four weeks of the work.

   c. On each occasion at minimum of six photographs representing at least three different Construction IAQ measures shall be taken. This represents a total of 18 photographs.

   d. Photographs shall be color, between 3"x5" and 8"x10" in size and of normal photographic quality (70 pixel resolution or better).
3. Filtration Media Product Data:
   a. Provide cut sheets for filtration media installed:
      1) During Construction.
      2) During the flush out.
      3) After the flush out and prior to occupancy.
      4) The cut sheets shall highlight the MERV values of the media.

4. Building IAQ Test Draft Plan:
   a. The plan shall describe the IAQ testing procedures planned for the project.
   b. The Plan shall be approved by the architect or mechanical engineer prior to initiation of
      the work.

5. Building IAQ Test Final Plan:
   a. Provide a copy of the approved Final Plan.
   b. The Final Plan shall include the actual dates of the IAQ testing.

PART 2 - PRODUCTS

2.01 MATERIALS (Not Used)

PART 3 - EXECUTION

3.01 INDOOR AIR QUALITY MANAGEMENT DURING CONSTRUCTION:

   A. During construction the Contractor shall meet or exceed the minimum requirements of the Sheet
   Metal and Air Conditioning National Association (SMACNA), IAQ Guidelines for Occupied Buildings
   under Construction, 2008, Chapters 3 and 4, for the items listed below. The SMACNA guidelines
   have been modified to address the special issues and needs of a new construction project:

   B. HVAC Protection:
      1. Protect all air handling and distribution equipment, and air supply and return ducting during
         construction.
      2. Adequately cover and protect all exposed air inlets and outlets openings, grilles, plenums,
         etc. to prevent water, moisture, dust, and other contaminate intrusion.
      3. Apply protection immediately after installation of equipment and ducting.
      4. Ducting runs that require more than a single day to install shall be protected at the end of
         each day's Work.
5. Install air filters with a MERV filtration value of 8, as determined by ASHRAE 52-2-1999, over all air return grilles.

C. Source Control:

1. Protect stored on-site or installed absorptive or porous materials such as batt insulation and drywall from exposure to moisture.
2. Do not use wet damaged porous materials in the building.
3. Provide adequate ventilation of packaged dry products prior to installation. Remove from packaging and ventilate in a secure, dry, well-ventilated space free from strong contaminant sources and residues.
4. Provide a temperature range of 60 degrees F minimum to 90 degrees F maximum continuously during the ventilation period. Do not ventilate within limits of Work unless otherwise approved by the Architect.
5. Route material deliveries and construction waste removal around the exterior of the building, not through it.

D. Pathway Interruption:

1. The Owner does not plan to occupy the building until construction is complete. Pathway interruption is not required for this project.

E. Housekeeping:

1. Minimize accumulation of dust fumes, vapors, or gases in the building.
2. Suppress dust with wetting agents or sweeping compounds.
3. Clean-up dust using a wet rag or damp mop.
4. Increase the cleaning frequency when dust build-up is noted.
5. Remove spills or excess applications of solvent-containing products as soon as possible.
6. Remove accumulated water and keep work areas as dry as possible.
7. Vacuum using HEPA filtered vacuum cleaners.
8. Store volatile liquids, including fuels and solvents, in closed containers and outside of the building when not in use.
9. Keep volatile liquid containers closed when the container is inside of the building and not in use.

F. Scheduling:

1. Schedule for application of interior finishes including time frames for the application of wet materials onto dry materials, dry materials onto wet materials, and expected curing times for applied wet materials.
2. Wet materials include all paints, adhesives, sealants, coatings, finishes, and spray-applied materials, such as structural fireproofing.

3. Insure that all wet applied interior finish materials are properly and fully cured before installing other finish materials over them.

4. Install carpets and furnishings after all of the interior finish materials have been applied and fully cured.

5. Provide sufficient ventilation, air circulation and air changes to properly cure materials.

6. Provide sufficient ventilation, air circulation and air changes to dissipate excessive humidity when present.

3.02 INDOOR AIR QUALITY MANAGEMENT PRIOR TO OCCUPANCY:

A. Building IAQ Test Procedure: After construction and prior to occupancy the Contractor shall conduct IAQ testing:

1. Using a qualified Testing Subcontractor, such as an Industrial Hygienist.

2. Prior to testing the Testing and Balancing, agency shall verify the performance of the HVAC air distribution system.

3. Establish a baseline IAQ test measuring the chemical contamminates listed below:

a. Carbon Dioxide (CO2):

   1) Include the following measurement only if the area is regularly occupied during the test.

   2) For Office Occupancy: 530 parts per million maximum differential to outdoor conditions for the office occupancy only.

   3) For Other Occupancies: The test requirement for other occupancy types is based on ventilation requirements defined by ASHRAE 62/1999. The maximum concentration differential in parts per million equals 8,300 times the metabolic rate, divided by the ventilation rate of outside air per person in cubic feet per minute based on occupancy levels in the space. For metabolic rate data see ASHRAE 55-1995a. For ventilation rate of outside air per person see ASHRAE 62-2001.

b. Formaldehyde:

   1) 50 parts per billion maximum.

c. Particulates:

   1) 150 micrograms per cubic meter maximum.

d. Total Volatile Organic Compounds (TVOC):

   1) 500 micrograms per cubic meter maximum
e. 4-PCH

1) 6.5 micrograms per cubic meter maximum.

4. For areas where test results exceed maximum limits, conduct a building temporary flushout of those areas as recommended by the Testing Subcontractor. The building flushout procedure should include:

a. Number of days of operation.

b. Number of hour and time of day of flushout.

c. Percent outside air mixture required.

B. After the temporary flushout, only for areas where it was required, conduct an IAQ Retest for the chemical contaminates that exceeded limit requirements during the baseline test.

C. After completion of the building flush out and immediately prior to occupancy, replace of all HVAC filtration media installed in the HVAC system during construction and/or during flush out with new filtration media. The new filtration media shall have at least a Minimum Efficiency Reporting Value (MERV) of 13 as determined by ASHRAE Standard 52.2-1999.

END OF SECTION
SECTION 01410
TESTING AND INSPECTION

PART 1 - GENERAL

1.01 CONTRACTOR'S QUALITY CONTROL SYSTEM

A. The Contractor shall establish a quality control system to perform sufficient inspection and tests of all items of work, including that of his subcontractors, to ensure conformance to the Contract Documents for materials, workmanship, construction, finish, functional performance and identification.

B. This control shall be established for all construction where the Contract Documents provide for specific compliance tests by testing laboratories or engineers.

C. Contractor's control system shall specifically include all testing assigned to the Contractor or his subcontractors by various sections of the Specifications.

1. Contractor's quality control system is the means by which he assures himself that his construction complies with the requirements of the Contract Documents.

2. Controls shall be adequate to cover all construction operations and shall be keyed to the proposed construction schedule.

1.02 INSPECTION OF THE WORK/TESTING LABORATORY

A. The Work shall be conducted under the general observation of the Architect and shall be subject to inspection by the Architect and other representatives of the District and County to insure strict compliance with the requirements of the Contract Documents. Such inspection may include mill, plant, shop, or field inspection, as required. The Architect shall be permitted access to all parts of the Work, including plants where materials or equipment are manufactured or fabricated.

B. The presence of the Architect or any inspector(s), however shall not relieve the Contractor of the responsibility for the proper execution of the Work in accordance with all requirements of the Contract Documents. Compliance is a duty of the Contractor, and said duty shall not be avoided by any act or omission on the part of the Architect or any inspector(s).

C. Testing and inspections per special inspection requirements of the Uniform Building Code, and as called for in these specifications, will be performed by an independent testing laboratory as selected and paid for by the Owner.

D. Testing and inspection services which are performed shall be in accordance with requirements of the Uniform Building Code, current adopted edition, and as specified herein. Testing and inspection services shall verify that work meets the requirements of the contract documents.

1. Selection of the material required to be tested will be by the laboratory and not by the Contractor.

E. Testing and inspections will be performed by an independent testing laboratory selected and employed by the Contractor. Procedural and acceptance criteria are set forth in California Code of Regulations (CCR) Title 24 Part 1, Administrative Regulations, Sec. 4-335, for testing of
materials and Sed. 4-333 for special inspections and Interpretation of Regulations, IR 1-1, dated 9/89.

F. Testing and inspection services which are performed shall be in accordance with requirements of CCR Title 24 Part 1, Administrative Regulations, and as specified herein. Testing and inspection services shall verify that work meets the requirements of the Contract Documents.

G. In general, tests and inspections for structural materials shall include all items enumerated on the Structural Tests and Inspections list for this project as prepared and distributed by the Architect.

H. Test reports shall be signed by a registered Civil Engineer licensed in the State of California.

1.03 PAYMENTS

A. Costs of initial testing and special inspection, except as specifically modified hereinafter or specified otherwise in the technical sections, will be paid for by the Contractor, provided such tests indicate compliance with the contract documents. Initial tests and inspections are defined as the first tests and inspections as specified.

B. In the event a test or inspection indicates failure of a material or procedure to meet requirements of the contract documents, costs for retesting will be paid for by the Owner and backcharged to the Contractor.

C. Additional tests not specified but requested by the Architect, District or County, shall be paid for by the Owner, unless results of such tests or inspections are found not to be in compliance with the Contract Documents, in which case the Contractor will be backcharged for the costs for initial testing as well as retesting and re-inspection.

D. Costs for additional tests or inspections required because of change in materials being provided or change of source of supply shall be paid for by the Owner and backcharged to the Contractor.

E. Costs for any work which is required to correct any deficiencies shall be paid for by the Contractor.

F. Costs for any testing which is required solely for the convenience of the subcontractor in his scheduling and performance of the work shall be paid for by the subcontractor.

G. Overtime costs for testing and inspections performed outside the regular work day hours, including weekends and holidays, will be paid for by the Owner and backcharged to the Contractor.

H. Testing Laboratory will separate and identify on the invoices, the costs covering all testing and inspections which are to be backcharged to the Contractor as specified above.

1.04 TESTING AND INSPECTION REPORT

A. Testing laboratory will certify in writing that all work specified or required to be tested and inspected conforms to or does not conform to drawings, specifications and applicable building codes.
B. The Testing Laboratory will make the following distribution of all test and inspection reports within 15 days of testing:

- District: 1
- Architect: 1
- Structural Engineer: 1
- Contractor: 1
- Governing Building Dept.: 1

C. Test reports shall include all tests made, regardless of whether such tests indicate that the material is satisfactory or unsatisfactory. Samples taken but not tested shall also be reported. Records of special sampling operations as required shall also be reported. The reports shall show that the material or materials were sampled and tested in accordance with the requirements of CCR Title 24 Part 1 Administrative Regulations, Part 2 California Building Code, and with the approved specifications. They shall also state definitely whether or not the material or materials tested comply with requirements.

1.05 REPORTING TEST OR INSPECTION FAILURES

A. Immediately upon Testing Laboratory determination of a test or inspection failure, the Laboratory will telephone the results of test to Architect. On the same day, Laboratory will send written test results to those named on above distribution list.

B. Immediately upon notification of test or inspection failure, the Contractor shall notify the Architect of the test results and what steps will be taken to correct the problem areas.

1.06 AVAILABILITY OF SAMPLES

A. Contractor shall make materials required for testing available to Laboratory and assist in acquiring these materials as directed by Architect. The samples shall be taken under the immediate direction and supervision of the Testing Laboratory.

B. If work which is required to be tested or inspected is covered up without prior notice or approval, such work may be uncovered at the discretion of Architect.

C. Unless otherwise specified, Contractor shall notify Testing Laboratory a minimum of ten (10) working days in advance of all required tests, and a minimum of two (2) working days in advance of all required inspections.

D. Contractor shall give sufficient advance notice to Testing Laboratory in the event of cancellation or time extension of a scheduled test or inspection.

E. Material shipped by the Contractor from the source of supply before having satisfactorily passed such testing and inspection or before the receipt of notice from the District's Representative that such testing and inspection will not be required, shall not be incorporated in the Project.

1.07 REMOVAL OF MATERIALS

A. Unless otherwise directed, materials not conforming to the requirements of Contract Documents shall be promptly removed from the job site.
1.08 INSPECTION BY THE DISTRICT

A. The Architect shall at all times have access for the purpose of inspection to all parts of the work and to the shops wherein the work is in preparation, and the Contractor shall, at all times, maintain proper facilities and provide safe access for such inspection.

B. The District shall have the right to reject materials and workmanship which are defective, or to require their correction. Rejected workmanship shall be satisfactorily corrected and rejected materials shall be removed from the premises without charge to the District. If the Contractor does not correct such rejected work within a reasonable time, fixed by written notice, the District may correct such rejected work and charge the expense to the Contractor.

C. Should it be considered necessary or advisable by the District at any time before final acceptance of the entire work to make an examination of work already completed by removing or tearing out the completed work, the Contractor shall on request promptly furnish necessary facilities, labor and materials. If such work is found to be defective in any respect due to fault of the Contractor or his subcontractor, he shall defray all expenses of such examinations and of satisfactory reconstruction. If, however, such work is found to meet the requirements of the Contract, the additional cost of labor and material necessarily involved in the examination and replacement shall be allowed the Contractor.

1.09 COUNTY'S INSPECTOR

A. An Inspector employed by the County in accordance with the requirements of CCR Title 24 Part 1, Administrative Regulations, will be assigned to the work. His duties are specifically defined in CCR Title 24 Part 1, Sec. 4-342.

B. The work of construction in all stages of progress shall be subject to the personal continuous observation of the Inspector. He shall have free access to any or all parts of the work at any time. The Contractor shall furnish the Inspector reasonable facilities for obtaining such information as may be necessary to keep him fully informed respecting the progress and manner of the work and the character of the materials. Inspection of the work shall not relieve the Contractor from any obligation to fulfill this Contract.

END OF SECTION
SECTION 01450
ENVIRONMENTAL PROTECTION

PART 1 - GENERAL

1.01 SUMMARY

A. This Section establishes general requirements pertaining to abatement and control of environmental pollution arising from activities of the Contractor and his subcontractor or subcontractors in performance of the Work of the Contract.

1. The Contractor is required to implement Best Management Practices (BMP’s) during construction and prevent pollution to the storm water conveyance system. Also, adjacent storm drain inlets shall be protected at all times during the construction of the improvements.

2. Prior to the Notice to Proceed with construction, the Contractor shall complete, sign and submit the Construction Storm Water Management Plan (CSWMP) Form, to manage storm water and non-storm water discharges from the site at all times. The CSWMP shall describe all BMP’s to be implemented during construction. Specific BMP implementation may be dependent on wet or dry season operations, all to the satisfaction of the Architect. Contractor is responsible for complying with all codes, regulations, and modifications required by authorities having jurisdiction regarding the SWPPP.

B. Related work:

1. Documents affecting work of this Section include, but are not necessarily limited to, General Conditions and other Sections in Division 1 of these Specifications.

2. Additional requirements may be stated in various other Sections of the Specifications.


C. Definitions:

1. The term "environmental pollution," as used in this Section, means:

   a. The presence of chemical, physical, or biological elements or agents which:
      1) Adversely affect human health and/or welfare;
      2) Unfavorably alter ecological balances that are of importance to human life;
      3) Affect other species of importance to man;
      4) Degrade the utility of the environment for aesthetic and/or recreational purposes;

   b. The control of environmental pollution requires consideration of air, water and land, and involves noise, solid waste-management, and management of radiant energy and radioactive materials, as well as other pollutants.

2. Contaminants:

   a. “Sediment” means soil and other debris that have been eroded and transported by runoff water.

   b. “Solid waste” means rubbish, debris, garbage, and other discarded solid materials resulting from construction activities, including a variety of combustible and
noncombustible wastes such as ashes, waste materials resulting from construction or maintenance and repair work, leaves, and tree trimmings.

c. "Chemical waste" includes petroleum products, bituminous materials, salts, acids, alkalis, herbicides, pesticides, disinfectants, organic chemicals, and inorganic wastes; some of which may be classified as "hazardous."

d. "Sanitary wastes":
   1) "Sewage" means that which is considered as domestic sanitary sewage;
   2) "Garbage" means refuse and scraps resulting from preparation, cooking, dispensing, and consumption of food.

e. "Hazardous materials" means such materials as are so defined by applicable laws and regulations.

1.02 SUBMITTALS

A. Comply with pertinent provisions of Section 01300.

B. Prior to commencement of the Work of this Contract:
   1. Compile and submit to the Architect a written environmental protection program proposed by the Contractor for compliance with the requirements of this Section.
   2. Meet with the Architect to review the proposed environmental protection program and to make any changes in the plan, as required by the Architect, prior to commencement of the Work.
   3. Prior to commencement of the Work, secure the Architect's approval of the written environmental protection program.
   4. Obtain all necessary Federal and State approvals.

1.03 QUALITY CONTROL

A. Use adequate numbers of skilled workmen thoroughly trained and experienced in the necessary crafts and completely familiar with the specified requirements and methods needed for proper performance of the work of this Section.

B. Comply with all pertinent Federal, State, and local regulations pertaining to water, air, solid waste, and noise pollution.

C. Require subcontractors to comply with the provisions of this Section.

1.04 PAYMENT

A. Full compensation for making said provisions shall be considered as included in the contract price paid for the various items of work involved, and no additional compensation shall be allowed therefore.

PART 2 - PRODUCTS

2.01 MATERIALS (Not Used)
PART 3 - EXECUTION

Provide protection, operate temporary facilities and conduct construction in ways and by methods that comply with environmental regulations, and minimize the possibility that air, waterways and subsoil might be contaminated or polluted, or that other undesirable effects might result. Avoid use of tools and equipment which produce harmful noise over 85 decibels at 100 feet.

3.01 PROTECTION OF NATURAL RESOURCES

A. It is intended that the land resources within boundaries of the Project, but outside the limits of permanent Work performed under this Contract, shall be preserved in their present condition or be restored to a condition after completion of construction that will appear to be natural and not detract from the appearance of the Project.

1. Areas outside the project boundary are to be considered environmentally sensitive lands. No impact on these areas will be permitted, including disposing of construction materials, grading operations, storage or vehicles and equipment, access to other areas of the site or any other activity connected to the project.

B. Insofar as possible, Contractor shall confine activities to pertinent areas defined on the Drawings or elsewhere in the Contract Documents.

1. Return construction areas to their pre-construction elevations except where surface elevations are otherwise noted to be changed.
3. Conduct construction activities in such a manner that pooling of stagnant water will not occur at any time.

C. Land resources:

1. Do not remove, cut, deface, injure, or destroy trees or other vegetation outside the limits of the Work.
2. Do not remove, cut, deface, injure, or destroy trees or other vegetation inside the work area limits except as allowed in writing by the Architect.
3. Land resources damaged by the Contractor shall be promptly replaced or repaired to the approval of the District and at the Contractor’s expense.

D. Tree trimming:

1. In accordance with recognized standards for such work, and as indicated, trim and seal tree limbs overhanging the line of the Work and in danger of being damaged by the Contractor’s operations.
2. Remove other tree limbs as directed by the Architect so the tree will present a balanced appearance.
3. Roots:
   a. Do not cut roots unnecessarily during excavating or trenching operations.
   b. Expose roots 3" in diameter or larger, encountered in the course of excavation, and do not sever but wrap them in burlap as a protective measure while exposed.
   c. At the edge of the excavation or trench, neatly trim all roots 1" in diameter or larger that are severed in the course of excavation and paint them with a heavy coat of tree seal approved by the Architect.
E. Do not allow the depositing of mud and debris from construction vehicles onto public streets; sweep turning areas and pavement entrances as needed to remove any and all spills or material tracked onto the public street.

F. Water resources:
   1. Reference General Conditions regarding compliance with State Storm Water permit for Construction. Prevent oily or other hazardous substances from entering the ground, drainage areas, or other bodies of water in such quantities as to affect aesthetics or normal use or to produce a measurably impact upon the area.
   2. In accordance with applicable regulations, gather and dispose of soil or water which is contaminated with oily substance due to the Contractor's operations.
   3. De-chlorinate chlorinated water prior to discharge, and do not permit chlorinated water to enter the ground or surface waters.
   4. Do not pump ground water into natural surface water channels or in any other manner permit ground water to enter natural surface water.

G. Noise control:
   1. Do not permit noise levels exceeding the following:
   a. Trenchers, pavers, graders, and trucks: 85 dba at 100 feet as measured under the noisiest operating conditions;
   b. All other equipment: 85 dba at 50 feet.
   c. Use "whisperized" type generators as approved by the Architect.
   2. Jack hammers:
      a. Equip with exhaust mufflers and steel muffling sleeves;
      b. Use "whisperized" type air compressors as approved by the Architect.
   3. Operations:
      a. Keep noisy equipment as far as possible from noise-sensitive site boundaries;
      b. Do not leave machines idling;
      c. Use electric power in lieu of internal combustion engine power when practicable;
      d. Do not leave equipment on when unattended.
      e. Maintain equipment in a manner to reduce noise from excessive vibration, faulty mufflers, and similar sources;
      f. Provide mufflers on all engines;
      g. Schedule operations to minimize their duration at any given location.
   4. Monitoring:
      a. As needed, provide portable sound metering devices meeting requirements of ANSI S1.4 for Type 2 sound level meters.
      b. Promptly locate and correct non-complying noise levels.

3.02 ARCHAEOLOGICAL FINDINGS DURING CONSTRUCTION?

A. There are no known archaeological remains at the Project site. However, the District may employ a monitor during grading operations.

B. Should skeletons, artifacts, or other archaeological remains be uncovered:
   1. Suspend operations of this Contract at the site of discovery;
2. Continue operations in other areas;
3. Notify the Architect immediately of the finding.
4. The Architect will provide directions regarding resuming the work after archaeological investigations/evaluations are completed.

3.03 BURNING RUBBISH AND DEBRIS

A. Open burning of rubbish, debris, and/or other combustibles will not be permitted on the site.

3.04 DUST CONTROL

A. Provide within the proposed plan for environment protection an acceptable program to prevent generation of dust due to operation under this Contract. This includes dust in the buildings.

3.05 COMPLIANCE

A. The Architect will notify the Contractor in writing of any noncompliance with the provisions of this Section, and will describe actions to be taken.
   1. Such notice, when delivered to the Contractor or his authorized representative at the job site, will be deemed sufficient for the purpose.
   2. Immediately upon receipt of such notice, initiate the required action or actions.

B. Noncompliance:
   1. If the Contractor fails or refuses to comply promptly, the Architect may issue an order stopping all or part of the Work of this Contract until satisfactory corrective action has been taken.
   2. No part of the time lost due to any such Stop Orders shall be made the subject of a Claim for extension of time or for excess costs or damages by the Contractor.

END OF SECTION
PART 1 - GENERAL

1.01 DESCRIPTION:

A. Work included: Furnish all materials and labor to provide temporary facilities and controls during construction for all trades.

B. Job Conditions: Temporary facilities and construction processes and techniques employed on this project shall be in strict compliance with all applicable codes.

1.02 QUALITY ASSURANCE

A. Regulations: Comply with requirements of local laws and regulations governing construction and local industry standards, in installation and maintenance of temporary services and facilities.

1. Building Codes, including local requirements for permits, testing and inspection.

2. Local and county health and safety regulations.

3. Regulations and recommendations governing temporary utility services.


5. EPA regulations governing use of water and energy, and the control of dust, noise and other nuisances.

6. Requirements of the Regional Water Quality Board.

7. Code of Regulations that regulates environmental quality as outlined in Title 22 CCR.

8. OSHA Construction Safety Orders.


1. Refer to "Guidelines for Bid Conditions for Temporary Job Utilities and Services", prepared jointly by AGC and ASC, for industry recommendations.

2. Electrical Service: Comply with NEMA, NECA and UL standards and regulations for temporary electric service. Install service in compliance with National Electric Code (NFPA 70).

3. Inspections: Arrange for authorities having jurisdiction to inspect and test each temporary utility before use. Obtain required certifications and permits.
1.05 PROJECT CONDITIONS
   A. Conditions of Use: Keep temporary services and facilities clean and neat in appearance. Operate in a safe and efficient manner. Take necessary fire prevention measures. Do not overload facilities, or permit them to interfere with progress. Do not allow hazardous, dangerous, or unsanitary conditions, or public nuisances to develop or persist on the site.

1.06 TEMPORARY CONSTRUCTION SERVICES
   A. Make all necessary arrangements for, and provide, extend, and maintain temporary utility and construction services as described and as necessary for the work of all trades and workmen employed on the project, until completion and acceptance of the project by the County, or until no longer required. When no longer required, discontinue services and remove all related materials.

1.07 RUNWAYS, LADDERS, SCAFFOLDS AND TEMPORARY STAIRS
   A. Provide and maintain runways, ladders, scaffolds and temporary stairs to provide access to the work for the use of all trades.
   B. Provide all temporary means of access in accordance with the "Manual of Accident Prevention in Construction" of the Associated Prime Contractors of America and with applicable Federal, State, and Local Safety Regulations.

PART 2 - PRODUCTS

2.01 FACILITIES:
   A. Construction Fence and Yard Storage: Contractor will be responsible for all security controls on the project.
      1. Construction Fence: Provide and maintain a temporary construction fence. Fence shall be chainlink type, 6-feet high, complete with metal posts. Provide two gates, each one being a minimum of 12-feet wide. Provide separate man gate entrance. Fence shall enclose Limit of Work and Contractor's staging and operations area.
   B. Contractor's Job Office: Contractor shall coordinate with Architect for location of trailer. Construction office shall be equipped with telephone, internet service, fax machine, copier, equipment, furniture and storage required for smooth operation of the office. There shall be conference room to seat ten people, with table and chairs, for job site meetings.
      1. Contractor shall be responsible for costs of all utilities serving the house during the course of construction.
   C. Sanitary Facilities: Provide suitable chemical type toilets maintained in sanitary condition as approved by the Health Department. Toilets shall be removed, complete with contents upon completion of the project. All existing and newly constructed sanitary facilities within the building shall not be used under any circumstances.
   D. Portable Fire Extinguishers: As minimum requirement, provide one (1) standard UL listed multi-
purpose dry chemical fire extinguisher with a minimum rating of 3A-60BC for each 3000 square feet of new floor space or fraction thereof and one at each tool house, temporary office, paint storage room or workshop on the premises.

1. In lieu of the above, one (1) standard 2-1/2 gallon water and one (1) 10BC rated CO2 type extinguisher, mounted as a pair, may be used for the same areas.

2. The extinguishers provided should be capable of extinguishing any type of small fire and be so labeled or marked that the proper extinguisher would be used on a particular type of fire.

3. Instruction of workmen in the proper use of extinguishers is required.

4. Mount extinguishers on red-painted portable wooden stands no more than 150 feet apart.

5. Post local fire department call number on each telephone instrument at project site.

E. Enclosures: Provide temporary weather-tight closures of openings in exterior surfaces to provide acceptable working conditions and protection for materials, to allow for temporary heating, and to prevent entry of unauthorized persons. Building security must be maintained at all times.

F. Barricades: Construct and maintain fences, planking, barricades, lights, shoring, and warning signs as indicated on the drawings and as required by local authorities and state safety ordinances and as required to protect the County's property from injury or loss and as necessary for the protection of the public, and provide walks around obstructions made in a public place for carrying on the work covered in this contract. Provide temporary construction fencing to protect work site from unsupervised public access at all times, without exception. Leave protection in place and maintain in good condition until removal is authorized.

G. Shoring, Anchoring, Bracing: Provide temporary shoring, anchoring and bracing required by the nature of the work in order to make all parts absolutely rigid and stable. The Contractor shall be responsible for any damage resulting from failure to provide either through lack of proper judgment or from any other cause.

H. Temporary Job Sign: Contractor shall provide and maintain a project identification sign during the course of construction. Sign shall indicate the name of the project and shall identify the Coastside Fire Protection District and shall contain the District logo. Sign shall also include the logo, name, address and phone number for the Architect and Contractor. Architect will provide the sign artwork to the Contractor in a pdf file. Contractor shall submit the intended sign layout and design to the Architect for approval prior to fabrication.

1. Sign shall be constructed of 4x4 treated wood frame wrapped with 3/4" marine grade plywood on all sides. All corners shall be miter cut, glued and nailed to secure. Sign shall be approximately 4'-0" x 8'-0".

2. Sign shall receive a painted gloss background with painted gloss lettering. Colors of paint shall be as selected by Architect.

3. Lettering on signage shall be a minimum of 1" for text, with a minimum of 2" lettering for titles.
4. Other Signs: Subject to prior approval of the Architect as to size, design type and location and the local regulations, the Contractor may erect temporary signs for ease of identification and controlling traffic. The Contractor shall furnish, erect and maintain such signs as may be required by safety regulations and as necessary to safeguard life and property.

5. Signs for the purpose of Job Office identifications for the Contractor and Subcontractors, shall be uniform in appearance and shall not exceed the size of three (3) feet in height and four (4) feet in width.

6. Install the job site sign on the site at a location of high public visibility as approved by the Architect.

I. Storage Sheds for Tools, Materials, and Equipment: Contractor may provide weather-tight, with adequate space for organized storage and access, and lighting for inspection of stored materials.

2.02 TEMPORARY LIGHT AND POWER:

A. The Contractor shall provide metered temporary lighting and power, including connection, installation and maintenance. Furnish power and light to each trade as necessary to perform the work. Use of unmetered power for construction purposes will not be permitted. New permanent electric power and lighting systems may be used for construction operations. The Contractor shall furnish separate source of power for all welding operations. Maintain lighting and make routine repairs.

B. Install circuit and branch wiring, with area distribution boxes located so that power and lighting is available throughout the construction by use of construction-type power cords.

1. The minimum requirements for the system consist of lighting required for construction needs, safe and adequate working conditions, public safety, security lighting and lighting for temporary office, storage and construction buildings.

2. Provide all equipment, including connections and other materials necessary for extending the existing utility lines to where they will be used. Coordinate the installation with the Architect.

3. The Contractor shall arrange and pay for electric service through the local utility or furnish his own portable power.

4. All permanent power used by the Contractor prior to Occupancy shall be metered and paid for by the Contractor.

5. Once the building is enclosed and the HVAC equipment is operational, power shall be available at all times to allow operation of the HVAC equipment to provide air circulation.

6. Provide light levels complying with safety regulations and codes. Provide 20 foot candles minimum inside building and 5 foot candles outside and along perimeter of site.

7. Temporary electrical power for construction shall comply with applicable NEMA, NECA, and UL Standards safety regulations and codes; temporary power shall have automatic
ground fault feature and there shall be not less than one power center per floor for miscellaneous tools and equipment, located so that power is available at any desired point with no more than 100 ft. extension cords; weatherproof distribution boxes with minimum of four 20A, 120V, grounded outlets, circuit breaker protection for each outlet, and equipment grounding continuity for entire system shall be provided. Grounded UL extension cords shall be used from power centers to point of operation.

8. Ground-Fault Protection: Provide receptacle outlets equipped with ground-fault circuit interrupters, reset button and pilot light, for plug-in connection of power tools and equipment.

9. Provide temporary electric power for temporary field offices, temporary storage and construction buildings, temporary lighting, temporary HVAC, pumping and water control and miscellaneous requirements.

C. Remove temporary wiring and equipment when no longer needed and dispose of equipment and wiring. Repair holes left in paving, walls and partitions.

2.03. TEMPORARY HEATING, COOLING AND VENTILATION:

A. General: Portable devices will be necessary whenever heating or ventilating is required, such use and equipment used shall comply with requirements specified herein.

1. Heaters shall be NFPA approved and Underwriters Laboratories listed and approved by the Architect.

2. The Contractor shall pay cost of fuel used.

3. Use of unmetered gas obtained for temporary service is prohibited.

4. Provide temporary heat and ventilation as required to maintain adequate environmental conditions to facilitate progress of the work to meet specified minimum conditions including manufacturer's minimum recommended temperatures for the installation of materials, and to protect materials and finishes from damage due to temperatures or humidity. In no case shall temperature within building be less than 50 degrees F.

5. Provide adequate forced ventilation of enclosed areas for curing of installed materials to disperse humidity, and to prevent hazardous accumulations of dust, fumes, vapors and gases.

B. Unless specified otherwise in the Specification of this Contract, the Contractor shall:

1. Provide heat as necessary to protect all work, materials, and equipment against injury from dampness and cold.

2. Protect, cover and/or heat as may be necessary, to produce and maintain a temperature of not less than 50 degrees F., (1) in the concrete during the placing, setting and curing of concrete, and (2) in the plaster during the application, setting and curing of plaster.

3. Provide heat as necessary in the area where work is to be done to provide the minimum temperature recommended by the supplier or manufacturer of the material, but in no case less than 50 degrees F., for a period beginning ten (10) days before placing of
interior finishes and finish materials and continuing until completion or beneficial occupancy of the area, whichever is earlier.

C. Prior to and during plastering and drywall application, setting and curing thereof, provide sufficient heat to maintain building temperature of not less than 55 degrees F. while maintaining adequate ventilation for drying of plaster.

D. Before casework is delivered to the building and prior to installing wood finish, and throughout placing of this finish and other finishing operations such as painting and laying of resilient floor covering, provide sufficient heat to maintain building temperature at 65 degrees F.

E. Temporary Ventilation: Provide ventilation to prevent hazardous accumulations of dusts, fumes, mists, vapors or gases in areas occupied during construction.

F. Provide local exhaust ventilation to prevent harmful dispersal of hazardous substances into atmosphere of occupied areas.

G. Dispose of exhaust materials in manner that will not result in harmful exposure to persons.

H. Ventilate storage spaces containing hazardous or volatile materials.

2.04 TEMPORARY WATER:

A. Water: Extend water service from existing water services to the new structures or other areas of the construction site. A temporary system, consisting of temporary connections from the extended service is to be provided with temporary lines extended with necessary taps for connections at convenient locations. The entire distribution system shall be furnished, installed, maintained, metered, and paid for by Contractor. All water consumed shall be paid for by Contractor. Completely remove temporary system, except for existing lines shown on site plan, upon completion of construction. Clean and repair damage caused by installation; restore to original condition:

1. Furnish and install an approved double check valve at the connection to the main.

2. Perform all relocations required to clear work of others when requested by the Architect.

3. Where "non-potable" water is used, provide warning signs on the discharge end of each hose.

2.05 CONSTRUCTION EQUIPMENT

A. Contractor shall erect, equip, and maintain all construction equipment in strict accordance with all applicable statutes, laws, ordinances, rules and regulations of authority having jurisdictions.

B. Contractor shall provide, maintain and remove upon completion of the work all temporary rigging scaffolding, hoisting equipment, barricades and all other equipment required for all work hereunder.

C. Construction equipment shall conform to all the requirements of State, County, and local authorities and underwriters which pertain to operation, safety, and fire hazard.

2.06 CONSTRUCTION AIDS
A. Provide and operate drainage and pumping equipment; maintain excavations and site free of standing water.

2.07 STORAGE

A. Operations of the Contractor, including storage of materials, shall be confined to on-site areas approved by the Architect. Contractor shall be liable for damage caused by him during such use of property of the District, County or other parties. Contractor shall save the District, its officers and agents, and employees free and harmless from liability of any nature or kind arising from any use, trespass, or damage occasioned by his operations on premises of third persons.

PART 3 - EXECUTION

3.01 GENERAL REQUIREMENTS:

A. Provide all facilities and controls, of substantial construction, as required to serve intended purpose during full life of construction or for full extent of need during construction, and as approved by the Architect. Maintenance, operation, and control of all new or temporary electrical or mechanical facilities put into operation before final acceptance of project will complete responsibility of Contractor until final acceptance.

3.02 GRADES, LINES AND LEVELS:

A. All dimensions show for existing site conditions and all dimensions required for work of this Contract that is to be performed shall be verified by the Contractor by actual measurement of the existing conditions. Any discrepancies between the Contract requirements and the existing conditions shall be referred to the Quality Control Manager before any work affected thereby has been performed.

B. Establish and maintain all grades, lines, levels and bench marks and be responsible for same. Report any errors or inconsistencies before starting work.

1. Contractor is responsible for securing copies of the electronic files for the project coordinates, for use by Contractor’s surveyor to use in establish controls for the building location.

C. Provide and maintain well built batterboards at all corners and establish bench marks not less than two (2) widely separated places. As work progresses, establish bench marks at each floor or roof bearing as may be required, giving exact levels.

D. As work progresses, lay out forms, rough flooring on ground, exact locations of all partitions, where required, as a guide to all trades. Each trade shall lay out his work to interfere as little as possible with location of work of other trades. Bring obvious conflicts to the attention of the Architect.

3.03 REMOVAL:

A. As facilities and controls are no longer needed to serve original purpose, they shall be completely removed from site and all debris cleaned up and removed. At end of the Contract, and prior to final acceptance, no evidence of temporary facilities or Contractor's operations shall
remain.

B. Clean and repair damage caused by installation or use of temporary facilities. Remove temporary underground installations.

3.04 CLEANING DURING CONSTRUCTION

A. Cleaning shall be in accordance with Section 01720, "Cleaning".

END OF SECTION
PART 1 - GENERAL

1.1 SUMMARY

A. Section specifies the administrative and procedural requirements for diversion of non-hazardous construction and demolition waste from landfill.

1.2 PERFORMANCE REQUIREMENT

A. Performance Requirement: It is a requirement of this Project that a minimum of 75 percent (by weight) of non-hazardous construction and demolition debris be diverted from the landfill.

1.3 DEFINITIONS

A. Construction Waste: Building improvement materials and other solid waste resulting from construction, remodeling, renovation, or repair operations. Construction waste includes packaging materials such as cardboard.

B. Demolition Waste: Building improvement materials resulting from 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.

G. Recyclable Materials:
   1. Products and materials that can be recycled may include, but are not limited to, the following:

   a. Metals (ferrous and non-ferrous), including banding, metal studs, ductwork, aluminum cans, and piping.

   b. Gypsum board.

   c. Paper.

   d. Cardboard.

   e. Wood products, including crates and pallets.

   f. Carpet.

   g. Plastics.

   h. Copper wiring.

   i. Mechanical and electrical products and equipment.
2. Final determination of actual recyclable materials will be based on the local recycling facility capability.

1.4 SUBMITTALS

A. Waste Management Plan: Submit plan within 7 days of date established for the Notice to Proceed.

B. Waste Reduction Calculations: Before request for Substantial Completion, submit copies of calculated end-of-Project rates for salvage, recycling, and disposal as a percentage of total waste generated by the Work.

C. 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. If a construction and demolition recycling facility is used, include signed letters from the facility indicating the weight or volume of the material sent to the facility, as well as the state approved monthly diversion rates for that facility.

D. Submit other records, including records of sales and donations, as applicable and required to substantiate conformance with waste management goals.

1.5 WASTE MANAGEMENT GOALS

A. General: Develop waste management plan that results in end-of-Project rates for salvage/recycling of 75 percent by weight of total waste generated by the Work, at a minimum.

B. The Contractor shall take a proactive and responsible role in the management of construction waste, and shall require all subcontractors, vendors, and suppliers to participate in the effort.

C. The Contractor shall establish a construction waste management program for this Project that includes, but is not limited to, the following;
   1. Salvage and reuse.
   2. Salvage for resale.
   4. Disposal.

D. Only trash or waste materials that cannot be practically or economically reused or recycled shall be transported to the landfill.

1.6 WASTE MANAGEMENT PLAN

A. General: Develop plan consisting of waste identification and waste reduction work plan. Indicate quantities by weight or volume, but use same units of measure throughout Waste Management Plan.

B. Identify the off-site Recycling Service and Hauler of each designated debris item, who have agreed to accept and divert that item from landfill, and the proposed quantities. Schedule each item and list off-site Recycling Service and Hauler company name, telephone number, address, and person contacted.

C. Waste Identification: Indicate anticipated types and quantities of demolition and construction waste generated by the Work. Include estimated quantities and assumptions for estimates.
1.7 PLAN IMPLEMENTATION

A. Maintain a log of each load, of each category item diverted from landfill. Log in separately debris sent to a Class III and/or Class II landfills and materials sent to recycling facilities.
   1. Include in log, type of load, load weight, name of hauling service; recycling service or landfill, and date accepted by recycling service or by landfill.
   2. Owner reserves the right to audit the log at any time, retain and make available, all weight tickets, copies of receipts and invoices.
   3. Submit a Monthly Construction Waste Management Report with each Application for Payment. Monthly reports shall indicate all material removed from the project, and its eventual disposition, recycling or landfill. Provide weights for all materials and percentages of total waste recycled.

B. Material Handling:
   1. Separation Facilities:
      a. Designate a specific on site area or areas to facilitate separation of materials for potential salvage or reuse, recycling, and return.
      b. Keep waste bins and pile areas neat and clean. Clearly mark bins for each category of waste. Do not mix non-recyclable waste with materials designated for reuse or recycling.
   2. Do not permit designated materials to become contaminated or to contaminate site or surrounding areas.
   3. Construction and demolition recycling facilities are an acceptable means of landfill diversion. If such a facility is utilized, monthly diversion records for the construction and demolition recycling facility and a letter from the facility identifying weights or volumes of material processed by the facility for the Project must be submitted.

C. Training And Coordination:
   1. Furnish copies of the Waste Management Plan to all on-site supervisors and each subcontractor.
   2. Provide on-site instruction of appropriate separation, handling, and recycling, salvage or reuse, and return methods to be used by all entities at the appropriate stages of the Project.
   3. Include construction and demolition debris management on the agenda of meetings. At a minimum, discuss waste management goals and issues at the following meetings:
      a. Pre-construction meeting.
      b. Regularly scheduled job-site meetings.

END OF SECTION
SECTION 01600
MATERIAL AND EQUIPMENT

PART 1 - GENERAL

1.01 PRODUCTS

A. Products include materials, equipment, and systems.

B. Comply with Specifications and referenced standards as minimum requirements.

C. Components required to be supplied in quantity within a Specification section shall be the same, and shall be interchangeable.

1.02 WORKMANSHIP

A. Comply with industry standards except when more restrictive tolerances or specified requirements indicate more rigid standards or more precise workmanship.

B. Perform work by persons qualified to produce workmanship of specified quality.

C. Secure Products in place with positive anchorage devices designed and sized to withstand stresses, vibration, and racking.

1.03 MANUFACTURER'S INSTRUCTION

A. When work is specified to comply with manufacturer's instructions, submit copies as specified in Section 01300, distribute copies to persons involved, and maintain one set in field office.

B. Perform work in accordance with details of instructions and specified requirements. Should a conflict exist between Specifications and instructions, consult with Quality Control Manager and/or the Architect.

1.04 TRANSPORTATION AND HANDLING

A. Transport products by methods to avoid product damage; deliver in undamaged condition in manufacturer's unopened container or packaging.

B. Provide equipment and personnel to handle products by methods to prevent soiling or damage.

C. Promptly inspect shipments to assure that products comply with requirements, quantities are included, and products are undamaged.

1.05 STORAGE AND PROTECTION

A. Store products in accordance with manufacturer's instructions, with seals and labels intact and legible. Store sensitive products in weather-tight enclosures; maintain within temperature and humidity ranges required by manufacturer's instructions.
B. For exterior storage of fabricated products, place on sloped supports above ground. Cover products subject to deterioration with impervious sheet covering; provide ventilation to avoid condensation.

C. Store loose granular materials on solid surfaces in a well-drained area; prevent mixing with foreign matter.

D. Arrange storage to provide access for inspection. Periodically inspect to assure products are undamaged, and are maintained under required conditions.

E. After installation, provide coverings to protect products from damage from traffic and construction operations; remove when no longer needed.

END OF SECTION
SECTION 01700
CONSTRUCTION PROCEDURES

1.01 DEFINITIONS

A. Concealed Spaces: Spaces which are not accessible after completion of construction.

B. Cutting: Removal of material by cutting, sawing, drilling, breaking, chipping, grinding, and similar operations, including excavation.

C. Damage: Any sort of deterioration whether due to weather, normal wear and tear, accident, or abuse, resulting in soiling, marring, breakage, corrosion, rotting, or impairment of function.

D. Debris: Rubbish, waste materials, litter, volatile wastes, and similar materials, with the exception of surplus materials which are to become the property of the Owner.

E. Operational Elements: Equipment, moving parts, electrical conductors, sound and vibration control materials, waterproofing, vapor retarders, piping, ducts, tanks, and other similar materials and components which convey or retard the passage of liquids, gases, heat, light, persons, animals, or insects or which perform a similar function; not including structural elements.

F. Patching: Restoration to completed condition by patching, repairing, finishing, filling, closing up, and similar operations.

G. Replacement: Replace the entire element, surface, or product.

1.02 SUBMITTALS

A. Proposals for Cutting and Patching: Submit request 10 working days in advance of the time the work is to be performed to obtain approval; include:

1. Description of the nature of the work and how it is to be performed, including reasons why cutting cannot be avoided.

2. Description of results expected, including impact on safety and on structural, operational, and visual qualities.

3. If utilities are affected, describe the changes required and be specific as to how long service will be cut off.

4. If cutting of structural work results in the need for additional reinforcement, provide details and engineering calculations to show how that reinforcement satisfies the original structural requirements.

5. Submit product data for materials proposed for patching.

B. Startup Reports: Include a statement that the item has been installed properly and is functioning correctly. Include the following information:

i) Item started up.

ii) Date of startup operation.

iii) Entity performing startup.

iv) Applicable specification section.

v) Results of startup.

vi) Signature of person performing startup.

C. Field Correction Requests: Submit immediately upon discovery of deviation required; include a
detailed description of the problem, recommended changes, and reasons it is not possible to comply with the Contract Documents.

D. Certificate from surveyor stating that the construction has been placed in the locations and at the elevations required by the Contract Documents.

1.03 PROJECT CONDITIONS

A. Take precautions to prevent fires and to facilitate fire-fighting operations.
   1. Keep flammable materials in non-combustible containers; store away from potential fire sources; remove flammable waste regularly.
   2. Keep temporary and permanent fire fighting facilities readily accessible; keep fire fighting routes open.
   3. Do not allow smoking in areas where highly combustible or explosive materials are present.
   4. Carefully supervise the operation of potential fire sources, including heating units.
   5. Conduct welding operations in manner to prevent fire; comply with local regulations.

B. Take precautions to prevent accidents due to physical hazards:
   1. Provide barricades, warning lights, or signs as required to inform personnel and the public of the hazard being protected against.
   2. Safety barricades: Comply with regulations.
   3. Provide temporary walkways where walking surfaces are hazardous.
   4. Provide construction fencing to secure entire site area.

C. Take care to prevent pollution of air, water, and soil. Comply with environmental protection regulations.
   1. The Contractor shall comply with all applicable standards, orders or requirements of the Clean Air Act of 1970, including but not limited to Section 306 (42 U.S.C. 7606), Executive Order 11738, prohibiting contracting with Clean Air Act violators; and Sections 608 and 609 (42 U.S.C. 7671g. 7671h) as amended November 15, 1990, prohibiting the intentional release of chlorofluorocarbons into the environment when performing work specified by the contract.
   2. The Contractor shall comply with all applicable standards, orders, or requirements issued under Section 508 of the Clean Air Act (33 U.S.C 1368) Executive Order 11738.
   3. The Contractor shall exercise extreme care when excavating adjacent to existing sewer systems. The Contractor shall include in his bid all labor and materials necessary to protect existing sewer facilities. If no pay item is provided in the contract for this work, full compensation for such work shall be considered as included in the prices bid for other items of work. The Contractor may be liable for all damages and fines associated with sewage spills caused by improper support or damage to the existing sewer facilities.
4. The Contractor shall comply with all applicable standards, orders or requirements of the Base regarding "Stormwater Management and Discharge Control", prohibiting the discharge of non-stormwater to a stormwater conveyance system.

5. The Contractor shall comply with all applicable standards, orders, or requirements of the Environmental Protection Agency regulations (40 CFR, Part 15).

6. The Contractor shall comply with all applicable standards, orders, or requirements of the Flood Disaster Protection Act of 1973 (42 USC 4001 et seq, as amended).

D. Prevent erosion due to rainwater runoff.

E. Control windblown dust; prevent nuisance to Owner’s personnel and visitors.

F. Prevent flooding of excavations, below-grade construction, and adjacent areas due to rainwater runoff.

G. Do not use tools or equipment which produce harmful levels of noise.

1. Minimize the use of noise-making tools and equipment during hours that adjacent areas are in use.

H. Keep the site and adjacent public ways free of hazardous and unsanitary conditions and public nuisances.

I. Control rodents and other pests.

J. Keep adjacent areas free of debris due to this work.

K. Provide adequate traffic control by means of signs, signals, and flagmen, as necessary.

L. Provide temporary means of draining roofs where required.

M. Conduct construction operations so that no part of the work is subjected to damaging operations or influences which are in excess of those to be expected during normal occupancy conditions.

N. Conduct construction operations so that waste of power, water, and fuel is avoided.

O. Provide temporary supports as required to prevent movement and structural failure.

P. Install products only during environmental conditions which will ensure the best possible results.

Q. During the progress of the work, the Contractor shall keep the site of the work and other areas used by it in a neat and clean condition, and free from any accumulation of rubbish. The Contractor shall dispose of all rubbish and waste materials of any nature occurring at the work site, and shall establish regular intervals of collection and disposal of such materials and waste. The contractor shall also keep its haul roads free from dirt, rubbish, and unnecessary obstructions resulting from its operations. Equipment and material storage shall be confined to areas approved by the Project Manager / Project Engineer. Disposal of all rubbish and surplus materials shall be off the site of construction, at the Contractor's expense, and in accordance with local codes and ordinances governing locations and methods of disposal, and in conformance with all applicable safety laws, and to the particular requirements of subpart H, Section 1926.252 of the OSHA Safety and Health Standards for Construction.

1.04 ILLNESS AND INJURY PREVENTION PROGRAM:
A. The Contractor shall comply with all the mandates of Senate Bill 198 and specifically shall have a written Injury Prevention Program in accordance with all applicable standards. This Program shall be on file at time of Notice of Award of Contract.

1.05 GRAFFITI CONTROL:

A. The Contractor shall maintain all site improvements, including any temporary facilities, equipment or other materials in a graffiti free condition throughout the construction period, until acceptance of the project by the Owner. Graffiti encountered on the job site shall be removed by the Contractor within twenty-four (24) hours.

1.06 SEQUENCING AND SCHEDULING

A. Install products only at the time and in the sequence which will ensure the best possible results.

B. Coordinate required administrative activities with related construction activities.

PART 2 - PRODUCTS

2.01 MATERIALS

A. Patching Materials: Identical to the materials of the work to be cut, unless indicated as specific materials specified in other sections.

PART 3 - EXECUTION

3.01 GENERAL EXAMINATION REQUIREMENTS

A. Prior to performing work, examine the applicable substrates and the conditions under which the work is to be performed.

B. If unsafe or otherwise unsatisfactory conditions are encountered, take corrective action before proceeding.

C. Conditions which could have been discovered by examination will not be allowed as cause for claims for extra work.

D. The existence and location of construction indicated as existing on the drawings are not guaranteed. In particular, verify the following:

   1. Underground utilities.
      (1) Other underground construction.
      (2) Location and invert elevation of points of connection to piped utilities.

E. Verify that utility requirements of operating equipment are compatible with building utilities.

F. Verify space requirements of items which are shown diagrammatically on the drawings.

3.02 GENERAL PREPARATION REQUIREMENTS

A. Take field measurements as required to fit the work properly.
B. Recheck measurements prior to installing each product.

3.03 GENERAL INSTALLATION PROCEDURES

A. Accurately locate the work and components of the work; make vertical work plumb; make horizontal work level.

B. See sections describing specific parts of the work for additional requirements.

C. Where space is limited, install components to maximize space available for maintenance and to maximize ease of removal for replacement.

D. In finished areas, conceal pipes, ducts, and wiring within the construction, unless otherwise indicated.

E. Coordinate exact locations of fixtures and outlets with finish elements.

F. Install work in such a manner and sequence as to preclude, if possible, or at least to minimize, cutting and patching.
   1. Do not cut any operational elements.

3.04 CUTTING AND PATCHING PROCEDURES

A. Use specified cutting and patching procedures when cutting or patching is required for any of the following activities:
   i) Fitting the parts of the work together.
   ii) Repairing existing work to remain.
   iii) Installing ill-timed work.
   iv) Removing and replacing defective and nonconforming work.
   v) Removing samples of work for testing.
   vi) Making openings in elements of work for penetrations, such as for piping, conduit, duct, and the like.
   vii) Uncovering work for observation.
   viii) Repairing damage.

B. Perform cutting and patching at earliest time feasible, unless otherwise indicated or directed by the Architect.

C. Use procedures specified in applicable product sections as well as those specified in this section:
   1. Use procedures recommended by original installer, when such information is available.
   2. Where required, obtain approval of procedures by the Architect.
   3. Cut using methods that are least likely to damage adjacent work and work to remain and which will provide proper surfaces for patching.
   4. Make cuts neatly with minimum disturbance of adjacent work.
   5. Use appropriate tools intended for sawing or grinding and not for chopping or hammering.
   6. Do not use pneumatic tools without prior approval.
7. Where installation of similar new work is included, perform patching in manner specified for installation of new work.

8. Where new work is inserted into or through the work that is cut, fit the patched work tightly to the new work.

9. Patch with seams which are durable and as invisible as possible.

10. Repair substrate prior to patching finish.

D. Employ skilled workers to perform cutting and patching work. Use the original installer of the work to perform cutting and patching.

E. Work Exposed to View: Do not cut or patch in a manner that would result in a lessening of the building’s aesthetic value, as determined by the Architect.

1. Generally, cut from exposed side into concealed spaces to avoid unnecessary damage to finish.

2. Do not cut and patch in a manner that would result in substantial visual evidence of cut and patch work.

3. Restore exposed patched finishes in a manner which eliminates evidence of patching and refinishing.

   (1) For continuous surfaces, extend refinish to nearest intersection, with a neat transition to adjacent surfaces.

   (2) For assemblies: Refinish entire unit.

   (3) Painted piping, conduit, and duct: Clean and repaint.

4. Remove and replace work which is patched in a visually unacceptable manner.

F. Structural Elements: Maintain structural capacities; do not increase deflection under design load; provide reinforcing where required. Before cutting any structural member, obtain the Architect's approval of the proposed method.

G. Existing Conditions: Patch existing work to match adjacent existing work to remain.

1. Where specified procedures for similar new work are applicable, use those procedures for cutting and patching existing construction.

2. Take precautions to avoid damage to unanticipated utilities and structural elements. If such elements are encountered, report nature and extent to the Architect and request instructions as to how to proceed.

H. Concealed Work: Uncover the concealed work, cut and patch, and patch the covering work.

I. Concrete and Masonry: Use saws or drills which produce a neat cut; remove in small sections.

   1. Overcuts will not be permitted.

J. Protect the part of the project which is exposed during cutting and patching operations from adverse weather.

3.05 INSTALLATION OF COMPONENTS
A. Install all products in accordance with manufacturer’s instructions and recommendations, whether conveyed in writing or not.

B. Mounting Heights: Where mounting heights are not indicated, install components at mounting normally encountered for similar components. Obtain the Architect’s instructions for uncertain mounting heights.

C. Separate incompatible materials with suitable materials or spacing.
   1. Prevent cathodic corrosion.

D. Joints in Exposed Work: Make joints of uniform widths. Where joint locations are not indicated, arrange joints for the best visual effect. When in doubt, obtain the Architect’s instructions.

E. After installation, adjust operating components to proper operation.

3.06 PROCEDURES FOR CORRECTION OF WORK

A. The following must be replaced (repair is not acceptable):
   1. Damaged surfaces exposed to view which cannot be repaired without visible evidence of repair.
   2. Components which cannot be repaired to proper operating condition.

B. Repair or Replace:
   1. Components which do not operate properly.
   2. Surfaces exposed to view which cannot be cleaned to original condition.
   3. Permanent facilities used during construction.
   4. Other defective work.

C. Acceptable Repair Methods:
   1. Replacing parts.
   2. Refinishing.
   3. Touching up with matching materials.
   4. Proper adjustment of equipment.

D. When it is necessary to deviate from the Contract Documents in order to accomplish corrective action, submit a field correction request.

E. Restore permanent facilities used during construction to specified condition.

3.07 FACILITY STARTUP

A. Put each item of equipment and each system into full, satisfactory operation.
B. Prior to Startup:

1. Verify that equipment and systems are complete, correctly connected to utilities, and tested.

2. Comply with requirements of manufacturer.

3. Inspect and test as required to ensure that work is installed as specified and to determine suitability for energizing.

4. Provide power and fuel for startup and testing.

5. Change over from temporary to permanent utility sources.

6. Re-adjust and lubricate operating components as required to ensure smooth and unhindered operation. Check drive rotations, belt tension, control sequences, and other features which might cause damage if not properly adjusted.

7. When specified or when required by manufacturer, have manufacturer’s representative prepare for startup or supervise such preparation.

C. Execute startup under supervision of responsible personnel in accordance with the manufacturer’s instructions. When specified or when required by manufacturer, have manufacturer’s representative perform startup.

D. After startup, adjust equipment and systems as required for proper operation. Where specified, perform tests or inspections to determine status of operation.

E. Demonstrate the operation and maintenance of equipment and systems to personnel designated by the Architect and Owner, prior to substantial completion.

1. Have final operating and maintenance data available during demonstration.

F. For equipment and systems which have different operation at different seasons, demonstrate operation during subsequent seasons until fully demonstrated.

3.08 FINAL CLEANING

A. Provide final cleaning as specified in Section 01720, Cleaning.

END OF SECTION
SECTION 01720
CLEANING

PART 1 - GENERAL

1.01 QUALITY ASSURANCE

A. Inspection: Conduct daily inspection, and more often if necessary, to verify that requirements of cleanliness are being met.

B. Codes and standards: In addition to the standards described in this Section, comply with all pertinent requirements of governmental agencies having jurisdiction.

1.02 PAYMENT

A. Full compensation for the required cleaning shall be considered as included in the contract price paid for the various items of work involved, and no additional compensation shall be allowed therefore.

PART 2 - PRODUCTS

2.01 CLEANING MATERIALS AND EQUIPMENT

A. Provide all required personnel, equipment, and materials needed to maintain the specified standard of cleanliness.

B. Use only the cleaning materials and equipment which are compatible with the surface being cleaned, as recommended by the manufacturer of the material.

PART 3 - EXECUTION

3.01 PROGRESS CLEANING

A. General:

1. Retain all stored items in an orderly arrangement allowing maximum access, not impeding drainage or traffic, and providing the required protection of materials.

2. Do not allow the accumulation of scrap, debris, waste material, and other items not required for construction of this Work.

3. At least weekly, and more often if necessary, completely remove all scrap, debris, and waste material from the job site.

4. Provide adequate storage for all items awaiting removal from the job site, observing all requirements for fire protection, safety, and protection of the environment.

5. Keep all streets clean and ensure that storm drain systems remain free of construction debris.

B. Site:
1. Daily, and more often if necessary, inspect the site and pick up all scrap, debris, and waste material. Remove all such items to the place designated for their storage.

2. Weekly, and more often if necessary, inspect all arrangements of materials stored on the site: restack, tidy, or otherwise service all arrangements to meet the requirements of paragraph A above.

3. Maintain the site in a neat and orderly condition at all times.

C. Structures:

1. Weekly, and more often if necessary, inspect the structures and pick up all scrap, debris, and waste material. Remove all such items to the place designated for their storage.

2. Weekly, and more often if necessary, sweep all interior spaces clean. "Clean", for the purpose of this subparagraph, shall be interpreted as meaning free from dust and other material capable of being removed by use of reasonable effort and handheld broom.

3. As required preparatory to installation of succeeding materials, clean the structures or pertinent portions thereof to the degree of cleanliness recommended by the manufacturer of the succeeding material, using all equipment and materials required to achieve the required cleanliness.

4. Following the installation of finish floor materials, clean the finish floor daily (and more often if necessary) at all times while work is being performed in the space in which finish materials have been installed. "Clean", for the purpose of this subparagraph, shall be interpreted as meaning free from all foreign material which may be injurious to the finish floor material.

3.02 FINAL CLEANING

A. Definition: Except as otherwise provided, "clean" (for the purpose of this Article) shall be interpreted as meaning the level of cleanliness generally provided by skilled cleaners using commercial quality building maintenance equipment and materials.

B. Prior to completion of the Work, remove from the job site all tools, surplus materials, equipment, scrap, debris, and waste. Conduct final progress cleaning as described in Article 3.01 above.

C. Site: Unless otherwise specifically directed, broom clean all paved areas on the site and all public paved areas directly adjacent to the site. Completely remove all resultant debris.

D. Structures:

1. Exterior: Visually inspect all exterior surfaces and remove all traces of soil, waste material, smudges, and other foreign matter. Remove all traces of splashed materials from adjacent surfaces. If necessary to achieve a uniform degree of exterior cleanliness, hose down the exterior of the structure. In the event of stubborn stains not removable with water, a light sandblasting or other cleaning at no additional cost to the Owner may be required.

2. Interior: Visually inspect all interior surfaces and remove all traces of soil, waste material, smudges, and other foreign matter. Remove all traces of splashed materials from adjacent surfaces. Remove all paint droppings, spots, stains, and dirt from finished surfaces. Use only the specified cleaning materials and equipment.

3. Glass: Clean all glass inside and outside.
4. Polished surfaces: To all surfaces requiring the routine application of buffed polish, apply the polish recommended by the manufacturer of the material being polished.

5. Timing: Schedule final cleaning as approved by the Architect to accept a completely clean project. Final cleaning must be complete prior to final walk through and acceptance of the project.

3.03 CLEANING DURING OWNER’S OCCUPANCY

A. Should the Owner occupy the Work or any portion thereof prior to its completion by the Contractor and acceptance by the Owner, responsibilities for interim and final cleaning of the occupied spaces shall be as determined by the Architect in accordance with the General Conditions of the Contract.

END OF SECTION
PART 1 - GENERAL

1.01 QUALITY ASSURANCE

A. Delegate the responsibility for maintenance of Record Documents to one person on the Contractor's staff.

B. Accuracy of Records: Thoroughly coordinate all changes within the Record Documents, making adequate and proper entries on each page of Specifications and each sheet of drawings and other Documents where such entry is required to properly show the change. Accuracy of records shall be such that future search for items shown in the Contract Documents may reasonably rely on information obtained from the approved Record Documents.

C. Timing of Entries: Make all entries within 24 hours after receipt of information.

1.02 SUBMITTALS

A. The Project Manager's approval of the current status of Record Documents will be a prerequisite to Owner's approval of requests for progress payments and final payment under the Contract.

B. Final Submittal: Prior to submitting request for final payment, submit the final Record Documents to the Project Manager and secure his approval.

1. Contractor shall stamp and sign the record documents. Stamp shall contain the heading "As-Builts".

1.03 PRODUCT HANDLING

A. Use all means necessary to maintain the job set of Record Documents completely protected from deterioration and from loss and damage until completion of the Work and transfer of the recorded data to the final Record Documents. In the event of loss of recorded data, use all means necessary to secure the data to the Architect's approval; such means shall include, if necessary in the opinion of the Architect, removal and replacement of concealing materials and, in such case, all replacements shall be to the standards originally specified in the Contract Documents.

1.04 PAYMENT

A. Full compensation for the required record drawings shall be considered as included in the contract price paid for the various items of work involved, and no additional compensation shall be allowed therefore.

PART 2 - PRODUCTS

2.01 RECORD DOCUMENTS

A. Job Set: Promptly following award of Contract, secure one complete set of all Documents comprising the Contract.
PART 3 - EXECUTION

3.01 RECORDING

A. Identification: Immediately upon receipt of the job set described above, identify each of the Documents with the title "RECORD DOCUMENTS - JOB SET."

B. Preservation:

1. Considering the Contract completion time, the probable number of occasions upon which the job set must be taken out for new entries and for examination, and the conditions under which these activities will be performed, devise a suitable method for protecting the job set to the approval of the Architect.

2. Do not use the job set for any purpose except entry of new data and for review by the Architect, until start of transfer of data to final Record Documents.

3. Maintain the job set at the site of Work.

C. Making entries on Drawings: Using an erasable colored pencil (not ink or indelible pencil), clearly describe the change by note and by graphic line, as required. Date all entries. Call attention to the entry by a "cloud" around the area or areas affected. In the event of overlapping changes, different colors may be used for each of the changes.

D. Making Entries on Other Documents: Clearly indicate the change by note in ink, colored pencil, or rubber stamp.

E. Conversion of Schematic Layouts:

1. In most cases on the Drawings, arrangement of conduits and circuits, piping, ducts, and other similar items, is shown schematically and is not intended to portray precise physical layout. Final physical arrangement is as determined by the Contractor, subject to the Architect's review. However, design of future modifications of the facility may require accurate information as to the final physical arrangement of items which are shown only schematically on the Drawings.

2. Show on the job set of Record Drawings, by dimension accurate to within 1", the centerline of each run of items such as are described in Paragraph 3.01.E.1 above. Clearly identify the item by accurate note such as "cast iron drain", "galv. water", etc. Show, by symbol or note, the vertical location of the item ("under slab", "in ceiling", "exposed", etc.). Make all identification sufficiently descriptive that it may be related reliably to the Specification.

3. Record elevations and exact locations of all new and existing utilities encountered or located underground.

4. Record revisions to electrical circuits.

5. The Architect may waive the requirements for conversion of schematic data where, in the Architect's judgment, such conversion serves no beneficial purpose. However, do not rely upon waivers being issued except as specifically issued in writing by the Architect.

6. Timing of Entries: Use all means necessary, including the proper tools for measurement, to determine actual locations of the installed items.
F. Contractor shall record Specification and Addenda. Contractor shall legibly mark-up each Section to record:

1. Manufacturer, trade name, catalog number, and supplier of each product and item of equipment actually installed.

2. Changes made by Revision Order, Directive and other modification.

3. Other matters not originally specified.

G. Shop Drawings and Samples. Contractor shall:

1. Maintain as record documents.

2. Legibly annotate shop drawings and samples to record changes made after approval.

3.02 AUDIT

A. Project record documents will be reviewed monthly by the Architect, who will use the current completeness of the record documents in evaluating the monthly progress payment request.

3.03 CHANGES SUBSEQUENT TO ACCEPTANCE

A. The Contractor shall have no responsibility for recording changes in the Work subsequent to acceptance of the Work by the Owner, except for changes resulting from replacements, repairs, and alterations made by the Contractor as part of his guarantee.

END OF SECTION
SECTION 01740

WARRANTIES

PART 1 - GENERAL

1.01 RELATED REQUIREMENTS

A. General Conditions of the Contract: Warranty, and Correction of Work.

B. Section 01 7700 - Contract Closeout: Contract closeout procedures.

C. Section 01 7700 - Contract Closeout: Operation and Maintenance Data.

D. Individual Specifications Sections: Provision of warranties required for specific products or work.

1.02 FORM OF SUBMITTALS

A. Form of Warranty: Written warranties, except manufacturer's standard printed warranties, shall be on the Contractor's, Subcontractor's, material supplier, or manufacturers own letterhead, addressed to the Owner. All warranties shall be submitted in duplicate, and in the format supplied with this section, modified as approved to suit the conditions pertaining to the warranty.

B. Bind warranties in commercial quality 8 1/2" x 11" binders, with hardback, cleanable, plastic covers.

C. Label cover of each binder with typed or printed title "WARRANTIES", with title of Project; name, address, and telephone number of Contractor; and name of responsible principal.

D. Table of Contents: Neatly typed, in the sequence of the Table of Contents of the Project Manual, with each item identified with the number and title of the specification section in which specified, and the name of Product or work item.

E. Separate each warranty with index tab sheets keyed to the Table of Contents listing. Provide full information, using separate typed sheets as necessary. List subcontractor, supplier, and manufacturer, with name, address, and telephone number of responsible principal.

1.03 PREPARATION OF SUBMITTALS

A. Obtain warranties, executed in duplicate by responsible subcontractor, suppliers, and manufacturers, within ten days after completion of the applicable item of work. Except for items put into use with Owner's permission, beginning of time of warranty will commence on the date of substantial completion.

B. Verify that documents are in proper form and contain full information.

C. All warranties shall be signed by both the General Contractor and the appropriate subcontractor.

D. Retain warranties until time specified for submittal.
1.04 TIME OF SUBMITTALS

A. For equipment or component parts of equipment put into service during construction with Quality Control Manager’s permission, submit documents within ten days after acceptance.

B. Make other submittals prior to final Application for Payment.

1.05 PAYMENT

A. Full compensation for the required warranties shall be considered as included in the contract price paid for the various items of work involved, and no additional compensation shall be allowed therefore.
WARRANTY FOR ________________________________ WORK

We, the undersigned, hereby warrant that Work described above which we have furnished and/or installed for the following project:

Coastside Fire Station #41
Coastside Fire Protection District
El Granada, California

This substitution is in accordance with the Contract Documents and that said Work as installed will fulfill or exceed all of the Warranty requirements. We agree to repair or replace our Work, together with any adjacent Work which is displaced or damaged by so doing, that proves defective in workmanship, material, or operation within a period of _____( ) year(s) from date of final acceptance of the project by the County or from the Date of Certificate of Substantial Completion, whichever is earlier, ordinary wear and tear and unusual abuse or neglect excepted.

In the event of our failure to comply with the above-mentioned conditions within a reasonable period of time, as determined by the County, after being notified in writing, we, the undersigned, collectively and separately do hereby authorize the County to have said defects repaired and/or replaced and made good, and to pay in discharging said Work, including all collection costs and reasonable attorney fees.

Date: ____________________________
(Subcontractor, Subcontractor, Manufacturer, Supplier)

By________________________________________
Title_____________________________________
State License No.____________________________

Date: ____________________________
(Contractor)

By________________________________________
Title_____________________________________
State License No.____________________________

Local Representative to be contacted for maintenance, repair and/or replacement service:

Name:_____________________________________
Address:__________________________________
Phone No.:_______________________________

END OF SECTION
PART 1 - GENERAL

1.01 SUMMARY

A. This Section includes general requirements that apply to implementation of commissioning without regard to systems, subsystems, and equipment being commissioned.

B. See Division 1 Section "HVAC Commissioning Requirements" and Division 1 Section Electrical System Commissioning Requirements for specific requirements for commissioning Electrical and HVAC systems.

1.02 DEFINITIONS

A. BoD: Basis of Design.

B. CxA: Commissioning Authority.

C. Contractor: General Contractor that is overall responsible for the construction of the project.

D. DDC Contractor: The specialty contractor responsible to furnish, install and program the Direct Digital Control (DDC) System

E. OPR: Owner's Project Requirements.

F. Systems, Subsystems, and Equipment: Where these terms are used together or separately, they shall mean "as-built" systems, subsystems, and equipment.

G. TAB: Testing, Adjusting, and Balancing.

1.03 COMMISSIONING TEAM

A. Members Appointed by Contractor: Individual(s), each having authority to act on behalf of the entity he or she represents, explicitly organized to implement the commissioning process through coordinated actions. The commissioning team shall consist of, but not be limited to, representatives of Contractor, including Project superintendent and subcontractors, installers, suppliers, and specialists deemed appropriate by the CxA.

B. Members Appointed by Contractor not detailed above:

   1. CxA: The designated person, company, or entity that plans, schedules, and coordinates the commissioning team to implement the commissioning process. Owner will engage the CxA under a separate contract.
2. Representatives of the facility user and operation and maintenance personnel.
3. Architect and engineering design professionals.

1.04 OWNER’S RESPONSIBILITIES

A. Provide the OPR documentation to the CxA and Contractor for use in developing the commissioning plan; systems manual; operation and maintenance training plan; and testing plans and checklists.

B. Assign operation and maintenance personnel and schedule them to participate in commissioning team activities including, but not limited to, the following:
   1. Coordination meetings.
   2. Training in operation and maintenance of systems, subsystems, and equipment.
   3. Testing meetings.
   4. Demonstration of operation of systems, subsystems, and equipment.

C. Provide utility services required for the commissioning process.

D. Provide the BoD documents, prepared by Architect and approved by Owner, to the CxA and Contractor for use in developing the commissioning plan, systems manual, and operation and maintenance training plan.

1.05 CONTRACTOR’S RESPONSIBILITIES

A. Contractor shall assign representatives with expertise and authority to act on behalf of the Contractor and schedule them to participate in and perform commissioning team activities including, but not limited to, the following:
   1. Participate in design- and construction-phase coordination meetings.
   2. Participate in maintenance orientation and inspection.
   3. Participate in operation and maintenance training sessions.
   4. Participate in final review at acceptance meeting.
   5. Certify that Work is complete and systems are operational according to the Contract Documents, including calibration of instrumentation and controls.
   6. Evaluate performance deficiencies identified in test reports and, in collaboration with entity responsible for system and equipment installation, recommend corrective action.
   7. Review and approve final commissioning documentation.

B. Subcontractors, like the DDC Contractor, shall assign representatives with expertise and authority to act on behalf of subcontractors and schedule them to participate in and perform commissioning team activities including, but not limited to, the following:
   1. Participate in design- and construction-phase coordination meetings.
   2. Participate in maintenance orientation and inspection.
   3. Participate in procedures meeting for testing.
   4. Participate in final review at acceptance meeting.
   5. Provide schedule for operation and maintenance data submittals, equipment startup, and testing to CxA for incorporation into the commissioning plan. Update schedule on a weekly basis throughout the construction period.
   6. Provide information to the CxA for developing construction-phase commissioning plan.
   7. Participate in training sessions for Owner's operation and maintenance personnel.
   8. Provide updated Project Record Documents to the CxA on a daily basis.
9. Gather and submit operation and maintenance data for systems, subsystems, and equipment to the CxA, as specified in Division 1 Section “Operation and Maintenance Data.”

10. Provide technicians who are familiar with the construction and operation of installed systems and who shall develop specific test procedures and participate in testing of installed systems, subsystems, and equipment.

C. Contractor to coordinate Subcontractor efforts for the preparation of Project-specific test and inspection procedures and checklists. The following items are required components of the documentation required from Contractor and Subcontractors.

1. Submit Project-specific test and inspection procedures and checklists to CxA for approval.

2. Description of expected performance for systems, subsystems, equipment, and controls.

3. Process and schedule for completing prestart and startup checklists for systems, subsystems, and equipment to be verified and tested.

4. Step-by-step procedures for testing systems, subsystems, and equipment with descriptions for methods of verifying relevant data, recording the results obtained, and listing parties involved in performing and verifying tests.

5. Process and schedule for documenting changes on a continuous basis to appear in Project Record Documents.

1.06 CxA's RESPONSIBILITIES

A. Organize and lead the commissioning team.

B. Prepare a construction-phase commissioning plan. Collaborate with Contractor and with subcontractors to develop test and inspection procedures. Include design changes and scheduled commissioning activities coordinated with overall Project schedule. Identify commissioning team member responsibilities, by name, firm, and trade specialty, for performance of each commissioning task.

C. Review and comment on submittals from Contractor for compliance with the OPR/BoD, Contract Documents, and construction-phase commissioning plan. Review and comment on performance expectations of systems and equipment and interfaces between systems relating to the OPR and BoD.

D. Convene commissioning team meetings for the purpose of coordination, communication, and conflict resolution; discuss progress of the commissioning processes. Responsibilities include arranging for facilities, preparing agenda and attendance lists, and notifying participants. The CxA shall prepare and distribute minutes to commissioning team members and attendees within seven workdays of the commissioning meeting.

E. At the beginning of the construction phase, conduct an initial construction-phase coordination meeting for the purpose of reviewing the commissioning activities and establishing tentative schedules for operation and maintenance submittals; operation and maintenance training sessions; TAB Work; and Project completion.

F. Observe and inspect construction and report progress and deficiencies. In addition to compliance with the OPR, BoD, and Contract Documents, inspects systems and equipment installation for adequate accessibility for maintenance and component replacement or repair.
G. Direct, witness, and document tests, inspections, and systems startup in coordination with Contractor's scheduling requirements.

H. Compile test data, inspection reports, and certificates and include them in the systems manual and commissioning report.

I. Certify date of acceptance and startup for each item of equipment for start of warranty periods.

J. Review Project Record Documents for accuracy. Request revisions from Contractor to achieve accuracy. Project Record Documents requirements are specified in Division 1 Section "Project Record Documents."

K. Review and comment on operation and maintenance documentation and systems manual outline for compliance with the OPR, BoD, and Contract Documents. Operation and maintenance documentation requirements are specified in Division 1 Section "Operation and Maintenance Data."

L. Prepare operation and maintenance training program and provide qualified instructors to conduct operation and maintenance training. Operation and maintenance training is specified in Division 1 Section "Demonstration and Training."

M. Prepare commissioning reports, describing any omissions and discrepancies in the mechanical systems.

N. Assemble the final commissioning documentation, including the commissioning report and Project Record Documents.

1.07 COMMISSIONING DOCUMENTATION

A. Index of Commissioning Documents: CxA shall prepare an index to include storage location of each document.

B. Owner’s Project Requirements/Basis of Design (OPR/BoD) Document: A written document, prepared by Architect, and Design Engineers, that detail the functional requirements of Project and expectations of how it will be used and operated. Owner shall supply information that assists in the preparation of the document. This document includes Project and design goals, measurable performance criteria, budgets, schedules, success criteria, and supporting information. A document, prepared by Architect, that records concepts, calculations, decisions, and product selections used to meet the OPR 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.

C. Commissioning Plan: A document, prepared by CxA, that outlines the schedule, allocation of resources, and documentation requirements of the commissioning process, and shall include, but is not limited to the following:

1. Plan for delivery and review of submittals, systems manuals, and other documents and reports. Identification of the relationship of these documents to other functions and a detailed description of submittals that are required to support the commissioning processes. Contractor established submittal dates shall include the latest date approved submittals must be received without adversely affecting commissioning plan.
2. Description of the organization, layout, and content of commissioning documentation and a detailed description of documents to be provided along with identification of responsible parties.
3. Identification of systems and equipment to be commissioned.
4. Description of schedules for testing procedures along with identification of parties involved in performing and verifying tests.
5. Identification of items that must be completed before the next operation can proceed.
6. Description of responsibilities of commissioning team members.
7. Description of requirements for operation and maintenance training, including required training materials.
8. Schedule for commissioning activities with specific dates coordinated with overall construction schedule.
9. Identification of installed systems, subsystems, and equipment, including design changes that occurred during the construction phase.

D. Test Checklists: Contractor/Subcontractor(s) shall develop test checklists for each system, subsystem, or equipment including interfaces and interlocks, and include a separate entry, with space for comments, for each item to be tested. Prepare separate checklists for each mode of operation and provide space to indicate whether the mode under test responded as required. Provide space for testing personnel to sign off on each checklist. Specific checklist content requirements are specified in Division 1 Sections "HVAC Commissioning Requirements" and "Electrical System Commissioning Requirements." Each checklist, regardless of system, subsystem, or equipment being tested, shall include, but not be limited to, the following:

1. Name and identification code of tested item.
2. Test number.
3. Time and date of test.
4. Indication of whether the record is for a first test or retest following correction of a problem or issue.
5. Dated signatures of the person performing test and of the witness, if applicable.
6. Individuals present for test.
7. Deficiencies.
8. Issue number, if any, generated as the result of test.

E. Certificate of Readiness: Certificate of Readiness shall be signed by each Contractor, Subcontractor(s), Installer(s), and CxA certifying that systems, subsystems, equipment, and associated controls are ready for testing. Completed test checklists signed by the responsible parties shall accompany this certificate.

F. Test and Inspection Reports: CxA shall verify the record test data, observations, and measurements on test checklists produced by the Contractor. Photographs, forms, and other means appropriate for the application shall be included with data. CxA shall compile test and inspection reports and test and inspection certificates and include them in systems manual and commissioning report.

G. Corrective Action Documents: CxA shall document corrective action taken for systems and equipment that fail tests. Include required modifications to systems and equipment and revisions to test procedures, if any. Retest systems and equipment requiring corrective action and document retest results.

H. Issues Log: CxA shall prepare and maintain an issues log that describes design, installation, and performance issues that are at variance with the OPR, BoD, and Contract
Documents. Identify and track issues as they are encountered, documenting the status of unresolved and resolved issues.

I. Commissioning Report: CxA shall document results of the commissioning process including unresolved issues and performance of systems, subsystems, and equipment. The commissioning report shall indicate whether systems, subsystems, and equipment have been completed and are performing according to the OPR/BoD, and Contract Documents. The commissioning report shall include, but is not limited to, the following:

1. Lists and explanations of substitutions; compromises; variances in the OPR/BoD, and Contract Documents; record of conditions; and, if appropriate, recommendations for resolution. This report shall be used to evaluate systems, subsystems, and equipment and shall serve as a future reference document during Owner occupancy and operation. It shall describe components and performance that exceed requirements of the OPR, BoD, and Contract Documents and those that do not meet requirements of the OPR, BoD, and Contract Documents. It may also include a recommendation for accepting or rejecting systems, subsystems, and equipment.

2. OPR and BoD documentation.
3. Commissioning plan.
4. Testing plans and reports.
5. Corrective modification documentation.
6. Issues log.
7. Completed test checklists.
8. Listing of off-season test(s) not performed and a schedule for their completion.

J. Systems Manual: CxA shall gather required information and compile systems manual. Systems manual shall include, but is not limited to, the following:

1. OPR/BoD, including system narratives, schematics, and changes made throughout the Project.
2. Project Record Documents as specified in Division 1 Section "Project Record Documents."
3. Final commissioning plan.
5. Operation and maintenance data as specified in Division 1 Section "Operation and Maintenance Data."

1.08 SUBMITTALS

A. Commissioning Plan: CxA shall submit two hard copies of the commissioning plan. Deliver one hard copy to Contractor and one copy to Architect.

B. Test Checklists and Report Forms: CxA shall submit sample checklists and forms to Contractor quality-control manager for review and comment. Submit two copies of each checklist and report form.

C. Certificates of Readiness: CxA shall submit Certificates of Readiness.

D. Test and Inspection Reports: CxA shall submit test and inspection reports.

E. Corrective Action Documents: CxA shall submit corrective action documents.
F. Commissioning Report: CxA shall submit two hard copies of the final commissioning report. CxA shall deliver one hard copy to Contractor and one copy to Architect.

1.09 QUALITY ASSURANCE

A. Instructor Qualifications: Factory-authorized service representatives experienced in training, operation, and maintenance procedures for installed systems, subsystems, and equipment.

B. Test Equipment Calibration: Comply with test equipment manufacturer's calibration procedures and intervals. Recalibrate test instruments immediately whenever instruments have been repaired following damage or dropping. Affix calibration tags to test instruments. Instruments shall have been calibrated within six months prior to use.

1.10 COORDINATION

A. Coordinating Meetings: CxA shall conduct monthly coordination meetings of the commissioning team to review progress on the commissioning plan, to discuss scheduling conflicts, and to discuss upcoming commissioning process activities.

B. Pretesting Meetings: CxA shall conduct pretest meetings of the commissioning team to review startup reports, pretest inspection results, testing procedures, testing personnel and instrumentation requirements, and manufacturers' authorized service representative services for each system, subsystem, equipment, and component to be tested.

C. Testing Coordination: CxA shall coordinate sequence of testing activities to accommodate required quality assurance and control services with a minimum of delay and to avoid necessity of removing and replacing construction to accommodate testing and inspecting.
   1. Schedule times for tests, inspections, obtaining samples, and similar activities.

D. Manufacturers' Field Services: CxA shall coordinate services of manufacturers' field services.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION

3.01 OPERATION AND MAINTENANCE TRAINING REQUIREMENTS

A. Training Preparation Conference: Before operation and maintenance training, CxA shall convene a training preparation conference to include Owner's operation and maintenance personnel, Contractor, and subcontractors. In addition to requirements specified in Division 1 Section "Demonstration and Training," perform the following:
   1. Review the OPR and BoD.
   2. Review installed systems, subsystems, and equipment.
   3. Review instructor qualifications.
   4. Review instructional methods and procedures.
5. Review training module outlines and contents.
6. Review course materials (including operation and maintenance manuals).
7. Inspect and discuss locations and other facilities required for instruction.
8. Review and finalize training schedule and verify availability of educational materials, instructors, audiovisual equipment, and facilities needed to avoid delays.
9. For instruction that must occur outside, review weather and forecasted weather conditions and procedures to follow if conditions are unfavorable.

B. Training Modules: Develop an instruction program that includes individual training modules for each system, subsystem, and equipment as specified in Division 1 Section “Demonstration and Training.”

END OF SECTION
SECTION 01820
DEMONSTRATION AND TRAINING

PART 1 - GENERAL

1.1 SUMMARY

A. This 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 videotapes.

B. See Divisions 2 through 16 Sections for specific requirements for demonstration and training for products in those Sections.

1.2 SUBMITTALS

A. Instruction Program: Submit two copies of outline of instructional program for demonstration and training, including 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.

B. Demonstration and Training Videotapes: Submit two copies within seven days of end of each training module.

1.3 QUALITY ASSURANCE

A. Facilitator Qualifications: A firm or individual experienced in training or educating maintenance personnel in a training program similar in content and extent to that indicated for this Project, and whose work has resulted in training or education with a record of successful learning performance.

B. Instructor Qualifications: A factory-authorized service representative, complying with requirements in Division 1 Section "Quality Requirements," experienced in operation and maintenance procedures and training.

C. Pre-instruction Conference: Conduct conference at Project site. Review methods and procedures related to demonstration and training.

D. Coordinate content of training modules with content of approved emergency, operation, and maintenance manuals. Do not submit instructional program until operation and maintenance data has been reviewed and approved by Quality Control Manager.
PART 2 - PRODUCTS

2.1 INSTRUCTION PROGRAM

A. Program Structure: Develop an instructional program that includes individual training modules for each system and equipment not part of a system, as required by individual Specification Sections, and as follows:

1. HVAC Equipment.
2. Energy Management System
3. Audio Visual Equipment

B. Training Modules: 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:

1. Basis of System Design, Operational Requirements, and Criteria: Include system and equipment descriptions, operating standards, regulatory requirements, equipment function, operating characteristics, limiting conditions, and performance curves.
2. Documentation: Review emergency, operations, and maintenance manuals; Project Record Documents; identification systems; warranties and bonds; and maintenance service agreements.
3. Emergencies: Include instructions on stopping; shutdown instructions; operating instructions for conditions outside normal operating limits; instructions on meaning of warnings, trouble indications, and error messages; and required sequences for electric or electronic systems.
4. Operations: Include startup, break-in, control, and safety procedures; stopping and normal shutdown instructions; routine, normal, seasonal, and weekend operating instructions; operating procedures for emergencies and equipment failure; and required sequences for electric or electronic systems.
5. Adjustments: Include alignments and checking, noise, vibration, economy, and efficiency adjustments.
6. Troubleshooting: Include diagnostic instructions and test and inspection procedures.
7. Maintenance: Include inspection procedures, types of cleaning agents, methods of cleaning, procedures for preventive and routine maintenance, and instruction on use of special tools.
8. Repairs: Include diagnosis, repair, and disassembly instructions; instructions for identifying parts; and review of spare parts needed for operation and maintenance.

PART 3 - EXECUTION

3.1 INSTRUCTION

A. Facilitator: Contractor shall engage a qualified facilitator to prepare instruction program and training modules, to coordinate instructors, and to coordinate between Contractor and Owner for number of participants, instruction times, and location.

B. 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.
C. Scheduling: Provide instruction at mutually agreed on times. For equipment that requires seasonal operation, provide similar instruction at start of each season.

1. Schedule training with Owner, through Architect, with at least seven days’ advance notice.

D. Evaluation: At conclusion of each training module, assess and document each participant's mastery of module by use of a written performance-based test.

3.2 DEMONSTRATION AND TRAINING VIDEOTAPES

A. General: Engage a qualified commercial photographer to record demonstration and training videotapes. Record each training module separately. Include classroom instructions and demonstrations, board diagrams, and other visual aids, but not student practice.

1. At beginning of each training module, record each chart containing learning objective and lesson outline.

B. Video Format: Provide high-quality recording on thumbdrive.

C. Narration: Describe scenes on videotape by audio narration by microphone while dubbing audio narration off-site during the time video is recorded. Include description of items being viewed. Describe vantage point, indicating location, direction (by compass point), and elevation or story of construction.

END OF SECTION
SECTION 02230

TREE REMOVAL, SITE CLEARING, STRIPPING AND GRUBBING

PART 1  GENERAL

1.1 SECTION INCLUDES

A. Protecting existing trees and vegetation to remain.
B. Trimming tree limbs and roots.
C. Removing trees as designated.
D. Clearing vegetation, debris, trash and other materials within limits indicated.
E. Grubbing of vegetation within limits indicated.
F. Stripping of topsoil within limits indicated.
G. Removing above-grade site improvements within limits indicated.
H. Disconnecting, capping or sealing, and abandoning site utilities in place.
I. Disconnecting, capping or sealing, and removing site utilities.
J. Disposing of objectionable material.

1.2 RELATED SECTIONS

A. Section 02300, Earthwork.
B. Section 02221, Building Demolition.

1.3 RELATED DOCUMENTS

A. Arborist’s report – N/A

C. Caltrans Standard Specifications.
   1. Section 16, Clearing and Grubbing.

1.4 RELATED DOCUMENTS
A. Applicable Publications
   2. “Arboriculture,” the care of trees and shrubs by Dr. Richard Harris.

1.5 DEFINITIONS


B. CAL-OSHA: California Occupational Safety and Health Administration.

C. Topsoil: Natural or cultivated surface-soil layer containing organic matter and sand, silt, and clay particles; friable, pervious, and black or a darker shade of brown, gray, or red than underlying subsoil; reasonably free of subsoil, clay lumps, gravel, and other objects more than 2-inches in diameter; and free of weeds, roots, and other deleterious materials.

1.6 SUBMITTALS

A. Follow Submittal procedure outlined in Section 02000.

B. Photographs or videotape, sufficiently detailed, of existing conditions of trees and plantings, adjoining construction, and site improvements that might be misconstrued as damage caused by site clearing.

1.7 QUALITY ASSURANCE

A. Do not remove or prune trees without first securing a permit from the appropriate agency.

B. Prune to the standards of the International Society of Arborists and to ANSI 300.

1.8 PROJECT CONDITIONS

A. Except for materials indicated to be stockpiled or to remain the Owner’s property, cleared materials are the Contractor's property. Remove cleared materials from site and dispose of in lawful manner.

B. Salvable Improvements: Carefully remove items indicated to be salvaged and store where indicated on plans or where designated by the Owner’s Representative. Avoid damaging materials designated for salvage.

C. Unidentified Materials;
   1. If unidentified materials are discovered, including hazardous materials that will require additional removal other than is required by the Contract Documents, immediately report the discovery to the Owner’s Representative.
   2. If necessary, the Owner’s Representative will arrange for any testing or analysis of the discovered materials and will provide instructions regarding the removal and disposal of the unidentified materials.
PART 2  PRODUCTS

2.1  SOIL MATERIALS

A. Backfill excavations resulting from demolition operations with on-site or import materials conforming to structural backfill defined in Section 02300.

PART 3  EXECUTION

3.1  PREPARATION

A. Protect and maintain benchmarks and survey control points during construction.

B. Locate and clearly flag trees and vegetation to remain or to be relocated.

C. Protect existing site improvements to remain during construction.

3.2  TREE PROTECTION

A. Erect and maintain temporary fence around drip line of individual trees or around perimeter drip line of groups of trees to remain. Remove fence when construction is complete.

B. Do not store construction materials, debris, or excavated material within drip line of remaining trees.

C. Do not permit vehicles or equipment within drip line of remaining trees.

D. Do not excavate within drip line of remaining trees, unless otherwise indicated.

E. Where excavation for new construction is required within drip line of trees, hand clear and excavate to minimize damage to root systems. Use narrow-tine spading forks, comb soil to expose roots, and cleanly cut roots as close to excavation edge as possible.
   1. Cover exposed roots with burlap and water regularly.
   2. Temporarily support and protect roots from damage until they are permanently relocated and covered with soil.
   3. Coat cut faces of roots more than 1-1/2-inches in diameter with an emulsified asphalt or other approved coating formulated for use on damaged plant tissues.
   4. Cover exposed roots with wet burlap to prevent roots from drying out. Backfill with soil as soon as possible.

3.3  TREE PRUNING

A. Prune trees to balance the crown, and eliminate hazards. Perform main work to reduce sail effect through thinning, reducing end weights, shortening long heavy limbs, removing deadwood, weak limbs and sucker growth. Prune limbs back to an appropriate lateral branch.
B. Make final cuts at the outer edge of the branch collar in accordance with the arborist’s recommendations.

C. Perform pruning work in a safe and proper manner, adhering to CAL-OSHA and ANSI Standards.

3.4 ROOT PRUNING

A. Do not cut tree roots greater than 3-inch in diameter and less than 12-inches below ground level without approval of the Owner’s Representative.

B. Cut tree roots cleanly, as far from the trunk as possible, and not underneath any area where walkways are to be constructed. Root pruning shall be to a depth of 18-inches.

C. Tree root prune using a Vermeer root-cutting machine. Obtain the Owner’s Representative’s approval before using alternate equipment or techniques.

D. Complete tree root pruning prior to any excavation adjacent to the tree.

E. Do not expose tree roots to drying out. Cover root ends with soil or burlap and keep moist until the final backfill is completed.

3.5 TREE REMOVAL

A. Remove trees designated for removal prior to the construction of new improvements.

B. Perform tree removal work in a safe and proper manner, adhering to CAL-OSHA and ANSI Standards.

C. Remove or grind stumps to a minimum of 18-inches below finish subgrade. Remove surface roots to this depth within 24-inches of the tree trunk.

3.6 RESTORATION

A. Restore damaged improvements to their original condition, as acceptable to the Owner’s Representative.

B. Repair or replace trees and vegetation indicated to remain that are damaged by construction operations, as directed by the Owner’s Representative.
   1. Employ a qualified arborist, licensed in jurisdiction where the Project is located, to submit details of proposed repairs and to repair damage to trees and shrubs.
   2. Replace trees that cannot be repaired and restored to full-growth status, as determined by the Owner’s Representative.

3.7 UTILITIES
A. Locate, identify, disconnect, and seal or cap off utilities indicated to be removed or abandoned.

B. Arrange to shut off indicated utilities with utility companies or verify that utilities have been shut off.

C. Existing Utilities: Do not interrupt utilities serving facilities occupied by Owner’s Representative or others unless authorized in writing by the Owner’s representative, and then only after arranging to provide temporary utility services according to requirements indicated.

D. Coordinate utility interruptions with utility company affected.

E. Do not proceed with utility interruptions without the permission of the Owner’s Representative’s and utility company affected. Notify Owner’s Representative and utility company affected two working days prior to utility interruptions. [verify notification time.]

F. Excavate and remove underground utilities that are indicated to be removed.

G. Securely close ends of abandoned piping with tight fitting plug or wall of concrete minimum 6-inches thick.

3.8 CLEARING AND GRUBBING

A. Remove obstructions, trees, shrubs, grass, and other vegetation to permit installation of new construction. Removal includes digging out stumps and obstructions and grubbing roots.

B. Remove trash, debris, logs, concrete, masonry and other waste materials.

C. Do not remove trees, shrubs, and other vegetation indicated to remain or to be relocated.

D. Completely remove stumps, roots, obstructions, and debris extending to a depth of 18-inches below subgrade.

E. Use only hand methods for grubbing within drip line of remaining trees.

3.9 TOPSOIL STRIPPING

A. Remove sod and grass before stripping topsoil.

B. Strip topsoil to whatever depths are encountered in a manner to prevent intermingling with underlying subsoil or other waste materials.

C. Remove trash, debris, weeds, roots, and other waste materials.
D. Stockpile topsoil materials designated to remain on site at a location approved by the Owner’s Representative at a location away from edge of excavations without intermixing with subsoil. Grade and shape stockpiles to drain surface water. Cover to prevent windblown dust.

E. Do not stockpile topsoil within drip line of remaining trees.

3.10 SITE IMPROVEMENTS

A. Remove existing above- and below-grade improvements as indicated and as necessary to facilitate new construction.

B. Remove slabs, paving, curbs, and gutters, as indicated. Where concrete slabs, curb, gutter and asphalt pavements are designated to be removed, remove bases and subbase to surface of underlying, undisturbed soil.

C. Unless the existing full-depth joints coincide with line of pavement demolition, neatly saw-cut to full depth the length of existing pavement to remain before removing existing pavement. Saw-cut faces vertically.

D. Remove driveways, curbs, gutters and sidewalks by saw cutting to full depth. If saw cut falls within 30-inches of a construction joint, expansions joint, score mark or edge, remove material to joint, mark or edge.

3.11 BACKFILL

A. Place and compact material in excavations and depressions remaining after site clearing in conformance with Section 02300.

3.12 DISPOSAL

A. Remove surplus soil material, unsuitable topsoil, obstructions, demolished materials, and waste materials, including trash and debris, and legally dispose of them off the Owner’s property.

END OF SECTION
SECTION 02280
TERMITE CONTROL

PART 1 - GENERAL

1.01 DESCRIPTION: Provide all necessary labor and materials for complete Termite Control work.

1.02 SUBMITTALS:
   A. Comply with the provisions of Section 01300.
   B. Product Data: Within 30 calendars of award of Contract, submit:
      1. Label of proposed material to be used that states ingredients, toxicities, methods and rates of application, disposal information, hazards and handling precautions.
      2. Manufacturer's recommendation of application which will become bases of installation.

1.03 GUARANTEE:
   A. Upon completion of the termite control work, and as a condition of final acceptance, submit to the Owner a written guarantee providing:
      1. That the application was made at the concentration, rates and methods in compliance with this Specification.
      2. That the effectiveness of the treatment is guaranteed for a term of five years.
      3. That any evidence of subterranean termite activity and/or damage to the structure resulting from such activity within the guarantee period will be treated and/or repaired at no cost to the Owner.
      4. That products used do not contain any known carcinogenic ingredients.

1.04 REGULATORY REQUIREMENTS
   A. Comply with all applicable regulatory requirements, including but not limited to:
      1. U.S. Department of Agriculture
      2. Federal Environmental Protection Agency.

PART 2 - PRODUCTS

2.01 MATERIALS
   A. Apply one of the following products: ProBuild TC, or approved equal per manufacturer's recommendation and per regulatory and health requirements.
   B. Products shall be registered with the Production and Marketing administration of the US
Department of Agriculture and registered and approved by the Federal Environmental Protection Agency. The label shall set forth the names and percents of active ingredients and application rates of formula. A copy of this registration and formula shall be presented to the Architect for approval.

C. The material shall be delivered to the project site in the original sealed and labeled containers of the manufacturer.

PART 3 - EXECUTION

3.01 SAFETY PRECAUTIONS:

A. The Contractor shall notify the Architect and the Owner five (5) working days in advance of applying termite control so that necessary notices may be issued and measures taken in order to protect site personnel from contamination and toxic fumes.

B. In the event vacation of the site is considered, the Contractor shall also stipulate the elapsed time necessary before safe re-entry is permissible.

C. The Contractor shall notify all on site work persons that a toxic material is going to be applied and that work in or adjacent to the involved area will be hazardous to their health.

3.02 APPLICATION:

A. Requirements: Use only a State and County Licensed Pest Control firm.

B. General: Apply a coarse spray minimum of 12 hours prior to placing concrete slabs on grade, and just prior to fine grading around perimeters of structures. Do not apply more than 24 hours before concrete pour. Coordinate final grading and planting operations so as to avoid disturbance of the treated material. Re-treat soil or fill or backfill material disturbed or placed after the treatment is applied. Observe manufacturer's directions and warnings regarding use and application of treatment. Do not apply when the soil or base course is excessively wet. Apply only during normal working hours. At the time of placing, earth shall be friable with a sufficient low moisture content to allow uniform distribution of the solution to required depth of penetration. Apply under and about buildings only.

C. Slabs on Grade: Treat entire building areas to be covered by concrete slabs on grade. Treat before placement of base course. After base course has been placed, treat the material at the same rate. Apply additional treatment as follows:

1. In critical areas, such as around utility openings for pipes, conduits and ducts, in a strip 6 inches wide.

2. Along the exterior perimeter of the slab and under expansion joints, in a strip 1 foot wide in shallow trench.

D. Foundation Walls and Grade Beams: Treat soil and fill material adjacent to all sides of foundation walls and grade beams, one foot in depth.
3.03 Guarantee:

A. Furnish the Owner a written guarantee, in an acceptable form, stating that application was made at the concentration rate and method(s) specified, and stating that the treatment will be effective against subterranean termite infestation for a period of not less than 5 years following date of treatment.

END OF SECTION
SECTION 02300

EARTHWORK

PART 1  GENERAL

1.1 SECTION INCLUDES

A. Excavation and/or embankment from existing ground to subgrade, including soil sterilant, for roadways, driveways, parking areas, walks, paths, or trails and any other site improvements called for on the Plans.

1.2 SECTION EXCLUDES

A. Earthwork related to underground utility installation, see Section 02310.

1.3 RELATED SECTIONS

A. Section 02230, Tree Removal, Site Clearing Stripping and Grubbing.
B. Section 02310, Utility Trenching and Backfill.
C. Section 02320, Pavement Subbase and Base Courses.
D. Section 02620, Subdrainage.

1.4 RELATED DOCUMENTS

B. ASTM:
   1. D 1557, Test Method for Laboratory Compaction Characteristics of Soil Using Modified Effort.
   2. D 1586, Method for Penetration Tests and Split-Barrel Sampling of Soils.
   3. D 2487, Classification of Soils for Engineering Purposes.
D. Caltrans Standard Specifications:
1. Section 17, Watering.
2. Section 19, Earthwork.

E. CAL/OSHA, Title 8.

1.5 DEFINITIONS

A. Borrow: Approved soil material imported from off-site for use as Structural Fill or Backfill.

B. Excavation: Removal of material encountered above subgrade elevations.
   1. Authorized Over-Excavation: Excavation below subgrade elevations or beyond indicated horizontal dimensions as shown on plans or authorized by the Geotechnical Consultant.
   2. Unauthorized Over-Excavation: Excavation below subgrade elevations or beyond indicated horizontal dimensions without authorization by the Geotechnical Consultant. Unauthorized excavation shall be without additional compensation.

C. Geotechnical Testing Agency: An independent testing agency qualified according to ASTM E 329 to conduct soil materials and rock definition testing, as documented according to ASTM D 3740 and ASTM E 548.

D. Structural Backfill: Soil materials approved by the Geotechnical Consultant and used to fill excavations resulting from removal of existing below grade facilities, including trees. See Section 02310 for trench backfill.

E. Structural Fill: Soil materials approved by the Geotechnical Consultant and used to raise existing grades.

F. Rock: Rock material in beds, ledges, unstratified masses, and conglomerate deposits and boulders of rock material ¾-cubic yards or more in volume that when tested by an independent geotechnical testing agency, according to ASTM D 1586, exceeds a standard penetration resistance of 100 blows/2-inches.

G. Structures: Buildings, footings, foundations, retaining walls, slabs, tanks, curbs, mechanical and electrical appurtenances, or other man made stationary features constructed above or below grade.

H. Subgrade: Surface or elevation remaining after completing excavation, or top surface of a fill or backfill immediately below subbase, base or topsoil materials.

I. Unsuitable Material: Any soil material that is not suitable for a specific use on the Project. The Geotechnical Consultant will determine if a soil material is unsuitable.

J. Utilities: onsite underground pipes, conduits, ducts and cables.
1.6 SUBMITTALS

A. Follow submittal procedure outlined in Section 02000.

B. Samples:
   1. If required by the Geotechnical Consultant, provide 40-pound samples sealed in airtight containers, tagged with source locations and suppliers of each proposed soil material from on-site or borrow sources. Do not import materials to the Project without written approval of the Geotechnical Consultant.
   2. Provide materials from same source throughout work. Change of source requires approval of the Geotechnical Consultant.

C. Material Test Reports: Provide, from a qualified testing agency, the following test results showing compliance with the project requirements:
   1. Classification according to ASTM D 2487 of each onsite or borrow soil material proposed for fill and backfill.
   2. Laboratory compaction curve in conformance with ASTM D 1557 for each onsite or borrow soil material proposed for fill and backfill.

1.7 QUALITY ASSURANCE

A. Provide an independent testing agency qualified according to ASTM E 329 to conduct soil materials and rock definition testing, as documented according to ASTM D 3740 and ASTM E 548.

B. Conform all work and materials to the recommendations or requirements of the Geotechnical Report and meet the approval of the Geotechnical Consultant.

C. Conform all work to the appropriate portion(s) of Caltrans Standard Specifications, Section 17 and 19.

D. Percentage of compaction specified shall be the minimum acceptable. The percentage represents the ratio of the dry density of the compacted material to the maximum dry density of the material as determined by the procedure set forth in ASTM D 1557.

E. Perform excavation, filling, compaction and related earthwork under the observation of the Geotechnical Consultant. Materials placed without approval of the Geotechnical Consultant will be presumed to be defective and, at the discretion of the Geotechnical Consultant, shall be removed and replaced at no cost to the Owner. Notify the Geotechnical Consultant at least 24-hours prior to commencement of earthwork and at least 48 hours prior to testing.

F. The Geotechnical Consultant will perform observations and tests required to enable...
him to form an opinion of the acceptability of the Project earthwork. Correct earthwork that, in the opinion of the Geotechnical Consultant, does not meet the requirements of these Technical Specifications and the Geotechnical Report.

G. Upon completion of the construction work, certify that all compacted fills and foundations are in place at the correct locations, and have been constructed in accordance with sound construction practice. In addition, certify that the materials used are of the types, quality and quantity required by these Technical Specifications and the Geotechnical Report. The Contractor shall be responsible for the stability of all fills and backfills constructed by his forces and shall replace portions that in the opinion of the Geotechnical Consultant have been displaced or are otherwise unsatisfactory due to the Contractor’s operations.

H. Finish soil grade tolerance at completion of grading:
   1. Building and paved areas: +0.05 feet.
   2. Other areas: ±0.10 feet.

1.8 PROJECT CONDITIONS

A. Promptly notify the Owner’s Representative of surface or subsurface conditions differing from those disclosed in the Geotechnical Report. First notify the Owner’s Representative verbally to permit verification and extent of condition and then in writing. No claim for conditions differing from those anticipated in the Contract Documents and disclosed in the Geotechnical Report will be allowed unless the Contractor has notified the Owner’s Representative in writing of differing conditions prior to the Contractor starting work on affected items.

B. Protect open excavations, trenches, and the like with fences, covers and railings to maintain safe pedestrian and vehicular traffic passage.

C. Prevent erosion of freshly graded areas during construction and until such time as permanent drainage and erosion control measures have been installed.

D. Temporarily stock-pile fill material in an orderly and safe manner and in a location approved by the Owner’s Representative.

E. Provide dust and noise control in conformance with Section 02000.

F. Environmental Requirements: When unfavorable weather conditions necessitate interrupting earthwork operation, areas shall be prepared by compaction of surface and grading to avoid collection of water. Provide adequate temporary drainage to prevent erosion. After interruption, compaction specified in last layer shall be re-established before resuming work.
PART 2 PRODUCTS

2.1 SOIL MATERIALS

A. General: Provide borrow soil materials when sufficient satisfactory soil materials are not available from on-site excavations.

B. Obtain approval of on-site soil materials and borrow materials to be used for structural fill or structural backfill from the Geotechnical Consultant.

C. On-Site Structural Fill and Structural Backfill: Soil or soil-rock mixture from on site excavations, free from organic matter or other deleterious substances. On-site structural fill and backfill shall not contain rocks or rock fragments over 6 inches in greatest dimension and not more than 15 percent shall be over 2-1/2 inches in greatest dimension and with an organic content less than 3.0 percent by weight.

D. Imported Structural Fill and Structural Backfill: Conform to the requirements of on-site structural fill. Material shall also be a non-expansive and predominantly granular soil or soil-rock mixture with plasticity index of 15 or less in accordance with ASTM D 4318 and an R-Value of 25 or greater.

2.2 SOIL STERILANT

A. Commercial chemical for weed control, registered by EPA. Provide granular, liquid or wet-able powder form.

PART 3 EXECUTION

3.1 GENERAL

A. Conform to Section 19, Earthwork, Caltrans Standard Specifications as modified by the Contract Documents.

B. Placement and compaction of material by flooding, ponding, or jetting will not be permitted.

C. The use of explosives will not be permitted.

3.2 CONTROL OF WATER AND DEWATERING

A. Prevent surface water and ground water from entering excavations, from ponding on prepared subgrades, and from flooding the site and surrounding area. Provide dewatering equipment necessary to drain and keep excavations and site free from water.

B. Dewater during backfilling operation so that groundwater is maintained a least one foot below grade.
below level of compaction effort.

C. Obtain the Geotechnical Consultant’s approval for proposed control of water and dewatering methods.

D. Protect subgrades from softening, undermining, washout and damage by rain or water accumulation.

E. Reroute surface water runoff away from excavated areas. Do not allow water to accumulate in excavations.

F. Maintain dewatering system in place until dewatering is no longer required.

3.3 WET WEATHER CONDITIONS

A. Do not prepare subgrade, place or compact soil materials if above optimum moisture content.

B. If the Geotechnical Consultant allows work to continue during wet weather conditions, conform to supplemental recommendations provided by the Geotechnical Consultant.

3.4 BRACING AND SHORING

A. Conform to California and Federal OSHA requirements.

B. Place and maintain such bracing and shoring as may be required to support the sides of the excavations for the proper protection of workmen; to facilitate the work; to prevent damage to the facility being constructed; and to prevent damage to adjacent structures or facilities. Remove all bracing and shoring upon completion of the work.

C. Be solely responsible for all bracing and shoring and, if requested by the Owner’s Representative, submit details and calculations to the Owner’s Representative. The Owner’s Representative may forward the submittal to the Geotechnical Consultant, the Consulting Engineer and/or the California Division of Industrial Safety for their review. The Contractor's submittal shall include the basic design, assumed soils conditions and estimation of forces to be resisted, together with plans and specifications of the materials and methods to be used, and shall be prepared by a civil engineer or structural engineer registered in California. No excavations related to the proposed facility shall precede a response to the submittal by the Owner’s Representative.

D. Be solely responsible for installing and extracting the sheathing in a manner which will not disturb the position or operation of the facility being constructed or adjacent utilities and facilities.

3.5 EXCAVATION
A. Excavate earth and rock to lines and grades shown on drawings and to the neat dimensions indicated on the Plans, required herein or as required to satisfactorily compact backfill.

B. Remove and dispose of large rocks, pieces of concrete and other obstructions encountered during excavation.

C. Where forming is required, excavate only as much material as necessary to permit placing and removing forms.

D. Provide supports, shoring and sheet piles required to support the sides of excavations or for protection of adjacent existing improvements.

3.6 REMOVAL OF EXISTING FILLS AND UNSUITABLE MATERIAL

A. Over-excavate areas of existing fills and other unsuitable material encountered during mass grading as directed by the Geotechnical Consultant.

B. Compensation for increased removal widths and depths that are not required by the Geotechnical Consultant will not be considered, except when such increase is necessary for protection of life and property as determined by and approved by the Owner.

C. The Geotechnical Consultant will provide written approval for each excavation prior to placement of fill. Allow adequate time after excavation and before filling for the Geotechnical Consultant’s review and written approval and, if necessary, time for the Owner’s Representative to conduct as built survey prior to placing fill. Basis for calculating the quantity of material excavated or placed may be the difference between the grading shown on the Plan and an as built survey of the grading.

3.7 GRADING

A. Uniformly grade the Project to the elevations shown on plans

B. Finish ditches, gutters and swales to the sections, lines and grades indicated and to permit proper surface drainage.

C. Round tops and bottoms of slopes as indicated or to blend with existing contours.

3.8 SUBGRADE PREPARATION

A. Install underground utilities and service connections prior to final preparation of subgrade and placement of base materials for final surface facilities. Extend services so that final surface facilities are not disturbed when service connections are made.

B. Prepare subgrades under paved areas, curbs, gutters, walks, structures, other surface facilities and areas to receive structural fill.
C. Prepare subgrades for paved areas, curbs and gutters by plowing or scarifying surface at least 6 inches below final subgrade elevations and 5-feet beyond edge of pavement unless specified otherwise by the Geotechnical Consultant. Uniformly moisture condition to obtain optimum moisture contents. Break clods and condition surface by harrowing or dry rolling. Remove boulders, hard ribs and solid rock. Prepare earth uniform for full depth and width of subgrade.

D. Protect utilities from damage during compaction of subgrades and until placement of final pavements or other surface facilities.

E. Obtain the Geotechnical Consultant’s approval of subgrades prior to placing pavement.

3.9 PLACEMENT OF STRUCTURAL FILL

A. Obtain the Geotechnical Consultant’s approval of surface to receive structural fill prior to placement of structural fill material.

B. Place structural fill on prepared subgrade.

C. Spread structural fill material in uniform lifts not more than 8-inches in un-compacted thickness and compact.

D. Place structural fill material to suitable elevations above grade to provide for anticipated settlement and shrinkage.

E. Overbuild fill slopes, as required by the Geotechnical Consultant, to obtain required compaction. Remove excess material to lines and grades indicated.

F. Do not drop fill on structures. Do not backfill around, against or upon concrete or masonry structures until structure has attained sufficient strength to withstand loads imposed and the horizontal structural system had been installed.

3.10 KEYWAYS AND BENCHES

A. Provide keyways as indicated for fill slopes steeper than 6 horizontal to 1 vertical. Extend keyway 5-feet minimum into competent, undisturbed soil or 3-feet minimum into competent, undisturbed rock as directed by the Geotechnical Consultant.

B. Place subsurface drains in bottom of keyway in conformance with Section 02620,

C. Bench subgrade as indicated above toe of fill.

D. Place subsurface drains at benches every 20 vertical feet or as directed by the Geotechnical Consultant.
3.11 LOT FINISH GRADING

A. Blade finish lots to lines and grades indicated.

3.12 COMPACTION AND TESTING

A. Do not compact by ponding, flooding or jetting.

B. Compact soils at optimum water content. Aerate material if it is too wet. Add water to material if it is too dry. Thoroughly mix lifts before compaction to ensure uniform moisture distribution.

C. Perform compaction using rollers, pneumatic or vibratory compactors or other equipment and mechanical methods approved by the Geotechnical Consultant.

D. Compaction requirements:
   1. Compact structural fills less than 5-feet thick to 90 percent compaction.
   2. Compact structural fill 5-feet thick or greater to 95 percent compaction.
   3. Compact the upper 6 inches of subgrade soils beneath pavements, curbs and gutters to 95 percent compaction. Extend compaction 5-feet beyond pavement edges unless specified otherwise by the Geotechnical Consultant.
   4. Compact the upper 6-inches of subgrade soils under walks, structures and areas to receive structural fill to 90 percent compaction.

3.13 SOIL STERILIZATION

A. Apply soil sterilant to areas indicated, such as beneath asphalt concrete pavement, brick pavement, concrete pavement and at grade concrete slabs, including sidewalks, curbs and gutters. Also where indicated apply soil sterilant below expansion and control joints and at areas where pipes, ducts or other features penetrate slabs.

B. Apply soil sterilant uniformly and at the rates recommended by the manufacturer.

C. Apply soil sterilant to prepared subgrade, or after installation of aggregate base as recommended by the manufacturer.

3.14 DISPOSAL

A. Lawfully dispose of all unsuitable and excess or surplus material off-site at no cost to the Owner.

END OF SECTION
SECTION 02310

UTILITY TRENCHING AND BACKFILL

PART 1  GENERAL

1.1 SECTION INCLUDES

A. Excavation, bedding, and backfill of underground storm drain, sanitary sewer and water piping and associated structures.

1.2 SECTION EXCLUDES

A. Drainage fill material and placement around subdrains. See Section 02620.

B. Trenching and backfill for other utilities such as underground electric, telephone, gas, cable TV, etc.

1.3 RELATED SECTIONS

A. Section 02300, Earthwork.

B. Section 02510, Water Distribution.

C. Section 02530, Sanitary Sewer System.

D. Section 02630, Storm Drainage System.

E. Section 02620, Subdrainage.

1.4 RELATED DOCUMENTS


B. ASTM:
   1. C 33, Specification for Concrete Aggregates.
   7. D 2487, Classification of Soils for Engineering Purposes.


D. Caltrans Standard Specifications:
   1. Section 19, Earthwork.
   2. Section 26, Aggregate Bases.
   3. Section 68, Subsurface Drains.
   4. Section 88, Engineering Fabrics.

E. CAL/OSHA, Title 8.

1.5 DEFINITIONS
A. AC: Asphalt Concrete.
C. Bedding: Material from bottom of trench to bottom of pipe.
D. CDF: Controlled Density Fill.
E. DIP: Ductile Iron Pipe.
F. Initial Backfill: Material from bottom of pipe to 12-inches above top of pipe.
G. PCC: Portland Cement Concrete.
H. RCP: Reinforced Concrete Pipe.
I. Springline of Pipe: Imaginary line on surface of pipe at a vertical distance of ½ the outside diameter measured from the top or bottom of the pipe.
J. Subsequent Backfill: Material from 12-inches above top of pipe to subgrade of surface material or subgrade of surface facility or to finish grade.
K. Trench Excavation: Removal of material encountered above subgrade elevations and within horizontal trench dimensions.
   1. Authorized Trench Over-Excavation: Excavation below trench subgrade elevations or beyond indicated horizontal trench dimensions as shown on plans or authorized by the Geotechnical Consultant.
   2. Unauthorized Trench Over-Excavation: Excavation below trench subgrade elevations or beyond indicated horizontal trench dimensions without authorization by the Geotechnical Consultant. Unauthorized excavation shall be without additional...
compensation.

L. Utility Structures:
   1. Storm drainage manholes, catch basins, drop inlets, curb inlets, vaults, etc.
   2. Sanitary sewer manholes, vaults, etc.
   3. Water vaults, etc.

1.6 SUBMITTALS

A. Follow submittal procedure outlined in Section 02000.

B. Product Data:
   1. Grading and quality characteristics showing compliance with requirements for the Work.
   2. Certify that material meets requirements of the Project.

C. Samples:
   1. If required by the Geotechnical Consultant, provide 40-pound samples of all imported trench bedding and backfill material sealed in airtight containers, tagged with source locations and suppliers of each proposed material. Do not import materials to Project without written approval of the Geotechnical Consultant.
   2. Provide materials from same source throughout work. Change of source requires approval of the Geotechnical Consultant and the Owner’s Representative’s.

D. Material Test Reports: Provide, from a qualified testing agency, the following test results showing compliance with the project requirements:
   1. Classification according to ASTM D 2487 of each imported trench bedding and backfill material.
   2. Laboratory compaction curve in conformance with ASTM D 1557 for each imported trench bedding and backfill material.

1.7 QUALITY ASSURANCE

A. Provide an independent testing agency qualified according to ASTM E 329 to conduct soil materials and rock definition testing, as documented according to ASTM D 3740 and ASTM E 548.

B. Conform all work and materials to the recommendations or requirements of the Geotechnical Report and meet the approval of the Geotechnical Consultant.

C. Conform all work to the appropriate portion(s) of the Caltrans Standard Specifications, Section 19.

D. Percentage of compaction specified shall be the minimum acceptable. The percentage represents the ratio of the dry density of the compacted material to the maximum dry density of the material as determined by the procedure set forth in ASTM D 1557.
E. The Geotechnical Consultant will perform observations and tests required to enable him to form an opinion of the acceptability of the trench backfill. Correct the trench backfill that, in the opinion of the Geotechnical Consultant, does not meet the requirements of these Technical Specifications and the Geotechnical Report.

1.8 PROJECT CONDITIONS

A. Promptly notify the Owner’s Representative of surface or subsurface conditions differing from those disclosed in the Geotechnical Report. First notify the Owner’s Representative verbally to permit verification and extent of condition and then in writing. No claim for conditions differing from those anticipated in the Contract Documents and disclosed in the Geotechnical Report will be allowed unless Contractor has notified the Owner’s Representative in writing of differing conditions prior to contractor starting work on affected items.

B. Protect open, trenches, and utility structure excavations with fences, covers and railings to maintain safe pedestrian and vehicular traffic passage.

C. Stockpile on-site and imported backfill material temporarily in an orderly and safe manner.

D. Provide dust and noise control in conformance with Section 02000, Supplemental General Requirements for Civil Improvements.

PART 2 PRODUCTS

2.1 PIPE BEDDING AND INITIAL BACKFILL

A. ASTM D 2321, Class IA, IB or II. Clean and free of clay, silt or organic matter.

B. Permeable Material: Conform to Section 68-1.025 of Caltrans Standard Specifications, Class 1, Type A or Class 2.

C. Class 2 Aggregate Base: Conform to Section 26 of Caltrans Standard Specifications, ¾-inch maximum.


2.2 WARNING TAPE

A. See Section 02510.

2.3 SUBSEQUENT BACKFILL

A. Conform to on-site or imported structural backfill in Section 02300, Earthwork.
2.4 CONTROLLED DENSITY FILL (CDF) (IN TRENCHES)

A. Provide non-structural CDF, from bottom of trench to finish subgrade of subbase or base material, that can be excavated by hand and produce unconfined compressive 28-day strengths from 50-psi to a maximum of 150-psi. Provide aggregate no larger than 3/8-inch top size. The 3/8-inch aggregate shall not comprise more than 30% of the total aggregate content.

B. Cement: Conform to the standards as set forth in ASTM C-150, Type II Cement.

C. Fly Ash: Conform to the standards as set forth in ASTM C-618, for Class F pozzolan. Do not inhibit the entrainment of air with the fly ash.

D. Air Entraining Agent: Conform to the standards as set forth in ASTM C-260.

E. Aggregates need not meet the standards as set forth in ASTM C-33. Any aggregate, producing performances characteristics described herein will be accepted for consideration. The amount of material passing a #200 sieve shall not exceed 12% and no plastic fines shall be present.

F. Provide CDF that is a mixture of cement, Class F pozzolan, aggregate, air entraining agent and water. CDF shall be batched by a ready mixed concrete plant and delivered to the job site by means of transit mixing trucks.

G. The Contractor shall determine the actual mix proportions of the controlled density fill to meet job site conditions, minimum and maximum strengths, and unit weight. Entrained air content shall be a minimum of 4.0%. The actual entrained air content shall be established for each job with the materials and aggregates to be used to meet the placing and unit weight requirements. Entrained air content may be as high as 20% for fluidity requirements.

H. Mix design shall meet the Geotechnical Consultant’s approval.

2.5 CONCRETE STRUCTURE BEDDING AND BACKFILL

A. Precast Structures: Same materials to the same heights as specified for pipe bedding and backfill, or other material approved by the Geotechnical Consultant.

B. Poured-in-Place Structures:
   1. Bedding: Bedding shall meet the approval of the Geotechnical Consultant. In general, bedding is not required, pour bases against undisturbed native earth in cut areas and against engineered fill compacted to 90% relative compaction in embankment areas.
   2. Side Backfill: On-site or imported structural fill meeting the requirements given in Section 02300.

2.6 FILTER FABRIC
A. Filter Fabric:
   2. Mirifi 140N (Mirifi Inc., Charlotte, NC) (Tel. 800-438-1855) or equal.

PART 3 EXECUTION

3.1 TRENCHING AND EXCAVATION

A. Existing PCC or AC Areas: Cut PCC or AC to full depth at a minimum distance of 12-inches beyond the edge of the trench.

B. Excavate by hand or machine. For gravity systems begin excavation at the outlet end and proceed upstream. Excavate sides of the trench parallel and equal distant from the centerline of the pipe. Hand trim excavation. Remove loose matter.

C. Excavation Depth for Bedding: Minimum of 4-inches below bottom of pipe or as otherwise allowed or required by the Geotechnical Consultant, except that bedding is not required for nominal pipe diameters of 2-inches or less.

D. Excavation Width at Springline of Pipe:
   1. Up to a nominal pipe diameter of 24-inches: Minimum of twice the outside pipe diameter, or as otherwise allowed or required by the Geotechnical Consultant.
   2. Nominal pipe diameter of 30-inches through 36-inches: Minimum of the outside pipe diameter plus 2-feet, or as otherwise allowed or required by the Geotechnical Consultant.
   3. Nominal pipe diameter of 42-inches through 60-inches: Minimum of the outside pipe diameter plus 3-feet, or as otherwise allowed or required by the Geotechnical Consultant.

E. Over-Excavations: Backfill trenches that have been excavated below bedding design subgrade, with approved bedding material.

F. Comply with the Owner’s Representative’s limitations on the amount of trench that is opened or partially opened at any one time. Do not leave trenches open overnight without the approval of the Owner’s Representative.

G. Where forming is required, excavate only as much material as necessary to permit placing and removal of forms.

H. Bottoms of trenches will be subject to testing by Geotechnical Consultant. Correct deficiencies as directed by the Geotechnical Consultant.

I. Grade bottom of trench to provide uniform thickness of bedding material and to provide uniform bearing and support for pipe along entire length. Remove stones to avoid point bearing.
3.2 CONTROL OF WATER AND DEWATERING

A. Be solely responsible for dewatering trenches and excavations and subsequent control of ground and surface water. Provide and maintain such pumps or other equipment as may be necessary to control ground water and seepage to the satisfaction of the Geotechnical Consultant and the Owner’s Representative until backfilling is completed.

B. Dewater during backfilling operation so that groundwater is maintained a least one foot below level of compaction effort.

C. Obtain the Geotechnical Consultant’s approval for proposed control of water and dewatering methods.

D. Reroute surface water runoff away from open trenches and excavations. Do not allow water to accumulate in trenches and excavations.

E. Maintain dewatering system in place until dewatering is no longer required.

3.3 BRACING AND SHORING

A. Conform to California and Federal OSHA requirements.

B. Place and maintain such bracing and shoring as may be required to support the sides of the excavations for the proper protection of workmen; to facilitate the work; to prevent damage to the pipes and appurtenances being constructed; and to prevent damage to adjacent structures or facilities. Remove all bracing and shoring upon completion of the work.

C. Be solely responsible for all bracing and shoring and, if requested by the Owner’s Representative, submit details and calculations to the Owner’s Representative. The Owner’s Representative may forward the submittal to the Geotechnical Consultant, the Consulting Engineer and/or the California Division of Industrial Safety for their review. The Contractor's submittal shall include the basic design, assumed soils conditions and estimation of forces to be resisted, together with plans and specifications of the materials and methods to be used, and shall be prepared by a civil engineer or structural engineer registered in California. No excavations in trench section or around structures shall precede a response to the submittal by the Owner’s Representative.

D. Be solely responsible for installing and extracting the sheathing in a manner which will not disturb the line, grade, or backfill compaction or operation of the utility being installed or adjacent utilities and facilities.

3.4 PIPE BEDDING

A. Obtain approval of bedding material from the Geotechnical Consultant.

B. Accurately shape bedding material to the line and grade called for on the Plans. Carefully
place and compact bedding material to the elevation of the bottom of the pipe in layers not exceeding 8-inches in loose thickness. Compact bedding material at optimum water content to 90% relative compaction unless specified otherwise on the Plans or by the Geotechnical Consultant. Compact by pneumatic tampers or other mechanical means approved by the Geotechnical Consultant. Jetting or ponding of bedding material will not be permitted.

C. Upon completion of bedding operations, and prior to the installation of pipe, notify the Geotechnical Consultant, who will inspect the bedding layer. Do not commence pipe laying until the Geotechnical Consultant has approved the bedding.

3.5 WARNING TAPE

A. Install in accordance with Section 02510.

3.6 BACKFILLING

A. Obtain approval of backfill material from Geotechnical Consultant.

B. Bring initial backfill up simultaneously on both sides of the pipe, so as to prevent any displacement of the pipe from its true alignment. Carefully place and compact initial backfill material to an elevation of 12-inches above the top of the pipe in layers not exceeding 8-inches in loose thickness. Compact bedding material at optimum water content to 90% relative compaction unless specified otherwise on the Plans or by the Geotechnical Consultant. Compact by pneumatic tampers or other mechanical means approved by the Geotechnical Consultant. Jetting or ponding of initial backfill material will not be permitted.

C. Bring subsequent backfill to subgrade or finish grade as indicated. Carefully place and compact subsequent backfill material to the proper elevation in layers not exceeding 8-inches in loose thickness. Compact bedding material at optimum water content to 90% relative compaction, except that the upper 36-inches in areas subject to vehicular traffic shall be compacted to at least 95% relative compaction, unless specified otherwise on the Plans or by the Geotechnical Consultant. Compact by pneumatic tampers or other mechanical means approved by the Geotechnical Consultant. Jetting or ponding of subsequent backfill material will not be permitted..

D. Do not use compaction equipment or methods that produce horizontal or vertical earth pressures which may cause excessive pipe displacement or damage the pipe.

E. Utility backfill shall be inspected and tested by the Geotechnical Consultant during placement. Cooperate with the Geotechnical Consultant and provide working space for such tests in operations. Backfill not compacted in accordance with these specifications shall be re-compacted or removed as necessary and replaced to meet the specified requirements, to the satisfaction of the Geotechnical Consultant and the Owner’s Representative prior to proceeding with the Project.
3.7 CLEANUP

A. Upon completion of utility earthwork all lines, manholes catch basins, inlets, water meter boxes and other structures shall be thoroughly cleaned of dirt, rubbish, debris and obstructions of any kind to the satisfaction of the Owner’s Representative.

B. See Section 02000 for further cleanup requirements.

END OF SECTION
SECTION 02320

PAVEMENT SUBBASE AND BASE COURSES

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Aggregate subbase and base.
B. Cement treated base.
C. Lime stabilization.

1.2 RELATED SECTIONS

A. Section 02300, Earthwork.
B. Section 02750, Asphalt Concrete Pavement.
C. Section 02751, Portland Cement Concrete Pavement.

1.3 RELATED DOCUMENTS


B. Caltrans Standard Specifications:
   1. Section 24, Lime Stabilization.
   2. Section 25, Aggregate Subbases.
   3. Section 26, Aggregate Bases.
   4. Section 27, Cement Treated Bases.

C. ASTM:
   1. D 1557, Test Method for Laboratory Compaction Characteristics of Soil Using Modified Effort.

1.4 DEFINITIONS


1.5 SUBMITTALS

A. Follow submittal procedure outlined in Section 02000.

B. Submit material certificates signed by the material producer and the Contractor, certifying
that each material item complies with, or exceeds the specified requirements.

1.6 QUALITY ASSURANCE

A. Do not mix or place cement treated base when the temperature is below 36 degrees F or when the ground is frozen.

B. Conform to the appropriate portions of the Geotechnical Report, these Specifications and Section 19 of Caltrans Standard Specifications.

C. Finish surface of the prepared subgrade to receive aggregate subbase, aggregate base or cement treated base, shall be as specified in Section 02300.

D. Finish surface of material to be stabilized prior to lime treatment shall be as specified in Section 24-1.04 of Caltrans Standard Specifications.

E. Finish surface of the stabilized material after lime treatment shall be as specified in Section 24-1.08 of Caltrans Standard Specifications.

F. Do not project the finish surface of aggregate subbase above the design subgrade.

G. Finish surface of aggregate base shall be +/- 0.05-feet.

H. Finish surface of cement treated base shall be as specified in Section 27 of Caltrans Standard Specifications.

I. Percentage of compaction specified shall be the minimum acceptable. The percentage represents the ratio of the dry density of the compacted material to the maximum dry density of the material as determined by the procedure set forth in ASTM Designation D1557.

PART 2 PRODUCTS

2.1 FILL MATERIAL

A. If fill material is required to restore the previously constructed subgrade to its proper elevation, provide structural fill material specified in Section 02300.

2.2 AGGREGATE SUBBASE


   1. Class 1, 2, or 3: Section 25-1.02A.

2.3 AGGREGATE BASE
   1. Class 2, 1-1/2-inch Maximum: Section 26-1.02A.

2.4 CEMENT TREATED BASE
A. Materials: Caltrans Standard Specification Section 27-1.02, Class B with a Portland cement content of no more than 2.5% by weight of the dry aggregate.

2.5 LIME STABILIZATION
A. Lime Treatment Material: Conform to Section 24-1.02 and 24-1.03 of Caltrans Standard Specifications.

PART 3 EXECUTION
3.1 SOIL STERILANT
A. Furnish and apply to areas indicated in accordance with Section 02300.

3.2 AGGREGATE SUBBASE
A. Spreading and Compacting: Sections 25-1.04 and 25-1.05 of Caltrans Standard Specifications.

3.3 AGGREGATE BASE
A. Watering, Spreading and Compacting: Section 26-1.035, 26-1.04 and 26-1.05 of Caltrans Standard Specifications.

3.4 CEMENT TREATED BASE
A. Cement treated base shall be plant mixed.
B. Proportioning and Mixing Plant-Mixed: Section 27-1.05 of Caltrans Standard Specifications.

3.5 LIME STABILIZATION
A. Performing the stabilization shall conform to Section 24-1.05, through 24-1.09 of Caltrans Standard Specifications and the following:
   1. Add lime in the amount of \[TBD\].
   2. Lime treat subgrade soils from back of curb to back of curb to a depth of at least \[TBD\].
   3. Mix in two mixing periods, both with the tines lowered to the same depth. Both mixing
periods shall be monitored and verified by the Geotechnical Consultant. The second mixing shall occur at about 24 hours after the initial mixing.

4. Compact and grade the lime mixed subgrade immediately after the second mixing.

5. Compact the lime treated subgrade to 93 percent as determined by ASTM D1557.

6. After application of the curing seal, do not allow traffic on the lime treated material for a period of 7 days in lieu of the 3 days specified in Section 24-1.03 of Caltrans Standard Specifications.

7. Proof-roll the stabilized subgrade after compacting to confirm that a non-yielding surface has been achieved. Yielding areas, if any, shall be mitigated. Mitigation could consist of over-excavation, utilization of stabilization fabric, or chemical treatment. Each case shall be addressed individually in the field by the Geotechnical Consultant.

END OF SECTION
SECTION 02630

STORM DRAINAGE SYSTEM

PART 1   GENERAL

1.1  SECTION INCLUDES

A.  Roadway and/or site storm drainage up to 5-feet of any on-site building.

B.  Pre-sloped channel drain system.

1.2  RELATED SECTIONS

A.  Section 02310, Utility Trenching and Backfill.

B.  Section 02620, Subdrainage.

C.  Section 03301, Portland Cement Concrete.

1.3  RELATED DOCUMENTS

A.  AASHTO:

1.  M 199:  Precast Reinforced Concrete Manhole Sections.


3.  M 294:  Corrugated Polyethylene Pipe, 12 to 24-inch Diameter.

B.  ASTM:


2.  A 615/A615M:  Deformed and Billet-Steel Bars for Concrete Reinforcement.


7.  D 1785:  Poly (Vinyl Chloride) (PVC) Plastic Pipe, Schedules 40, 80, and 120.


12.  D 3034:  Type PSM Poly(Vinyl Chloride) (PVC) Sewer Pipe and Fittings.


15.  F 656:  Primers for Use in Solvent Cement Joints of Poly(Vinyl Chloride)
(PVC) Plastic Pipe and Fittings.

C. AWWA:
3. C110: Ductile-Iron and Gray-Iron Fittings, 3 In. Through 48 In. (76 mm Through 1219 mm) for Water.

D. Caltrans Standard Specifications:
1. Section 51, Concrete Structures.
2. Section 52, Reinforcement.
3. Section 65, Reinforced Concrete Pipe.
4. Section 66, Corrugated Metal Pipe.
5. Section 70, Miscellaneous Facilities.
6. Section 72, Slope Protection.
7. Section 75 Miscellaneous Metal.

E. Caltrans Standard Plans:
1. Plan D94A: Metal and Plastic Flared End Sections.
2. Plan D94B: Concrete Flared End Sections.
3. Plan D97A: Corrugated Metal Pipe Coupling Details No.1, Annular Coupling Band Bar and Strap and Angle Connection.
4. Plan D97B: Corrugated Metal Pipe Coupling Details No. 2, Hat Band Coupler and Flange Details.
5. Plan D97C: Corrugated Metal Pipe Coupling Details No. 3, Helical and Universal Couplers.
6. Plan D97D: Corrugated Metal Pipe Coupling Details No. 4, Hugger Coupling Bands.
7. Plan D97E: Corrugated Metal Pipe Coupling Details No. 5, Standard Joint.
8. Plan D97F: Corrugated Metal Pipe Coupling Details No. 6, Positive Joint.
11. Plan D98B: Slotted Corrugated Steel Pipe Drain Details.

1.4 DEFINITIONS

A. AASHTO: American Association of State Highway and Transportation Officials.


E. CMP: Corrugated metal pipe.

F. DIP: Ductile iron pipe.

G. HDPE: High-density polyethylene.

H. NPS: Nominal pipe size.

I. PE: Polyethylene.

J. PVC: Polyvinyl chloride.

K. RCP: Reinforced concrete pipe.

1.5 SUBMITTALS

A. Follow submittal procedure outlined in Section 02000.

B. Product Data Shop Drawings, Etc.: For the following:
   1. Piping materials and fittings.
   2. Special pipe couplings.
   3. Polymer-concrete, channel drainage systems (trench drains).
   4. Joint sealants.
   5. Plastic area drains.
   6. Cleanout plugs or caps.
   7. Precast concrete catch basins, inlets, curb inlets, junction structures and area drains, including frames and grates.
   8. Precast clean out boxes and box covers.
   9. Concrete, metal and plastic flared end sections.
  10. Manufacturer’s product data, including installation instructions.

C. Design Mix Reports and Calculations: For each class of cast in place concrete.

D. Field Test Reports: Indicate and interpret test results for compliance with performance.

1.6 DELIVERY, STORAGE AND HANDLING

A. Do not store plastic structures, pipe and fittings in direct sunlight.

B. Protect pipe, fittings, and seals from dirt and damage.
C. Handle precast concrete pipe, manholes and other precast structures according to manufacturer’s written instructions.

D. Protect imported bedding and backfill material from contamination by other materials.

E. Deliver materials to site in manufacturer’s original, unopened containers and packaging, with labels clearly identifying product name and manufacturer.

PART 2    PRODUCTS

2.1    PIPING MATERIALS


B. ABS Pipe and Fittings: 4-inch through 12 inch, ASTM D 2751, SDR 35. Bell and spigot joints.

C. Cast Iron Pipe and Fittings: Hub and spigot, 2-inch through 15-inch, ASTM A74, service class.
   1. Gaskets: ASTM 564, rubber, compression type, thickness to match class of pipe.

   2. Bituminous Lining: Caltrans Standard Specification Section 66-1.03.

E. DIP: Sizes 4-inch through 48-inch.
   2. Pressure Class: Minimum pressure class for size indicated.
   3. Fittings:
      a. Standard: AWWA C110, sizes 4-inch through 48-inch.
      b. Compact: AWWA C153, sizes 4-inch through 24-inch.
   6. Joints:
a. Push-On Bell and Spigot Joint: AWWA C111.
b. Mechanical Joint: AWWA C111.
c. Flanged joint. AWWA C115.

F. Reinforced Concrete Pipe: Designated by Class, rubber gasketed joints.

G. PE Pipe and Fittings: 4-inch through 10-inch, AASHTO M 252 Type S, smooth interior and corrugated exterior. Bell and spigot joints.
   2. Couplings: AASHTO M 252, corrugated band type. Engage a minimum of 4 corrugations, 2 on each side of pipe joint.

   2. Couplings: AASHTO M 252, corrugated band type. Engage a minimum of 4 corrugations, 2 on each side of pipe joint.

I. PVC Pipe and Fittings-Smaller than 4-Inch: ASTM D1785, Schedule 40.
   1. Joints: Solvent Cement, ASTM D 2564. Include primer according to ASTM F656.

J. PVC Pipe and Fittings, 4-Inch and Larger
   1. Pipe:
      a. 4-inch through 15-inch: ASTM D 3034, SDR 35. Bell and spigot joints.
      b. 18 inch through 36-inch: ASTM F 679, T-1 wall. Bell and spigot joints.
   2. Fittings:
      a. 4-inch through 27-inch: ASTM F 1336.
      b. 30-inch through 36-inch: ASTM D 3034, SDR 35

2.2 PIPE ANCHORS

A. Portland Cement Concrete and Reinforcing: Section 03301.

2.3 SPECIAL PIPE COUPLINGS

A. Plastic, Cast Iron and Ductile Iron Pipe: ASTM C 1173, rubber or elastomeric sleeve and band assembly fabricated to match outside diameters of pipes to be joined.
B. Reinforced Concrete Pipe: Portland cement collar as indicated.
2.4 CLEANOUTS

A. Piping: Same as storm drain line if possible.

B. Top Plug or Cap: Same material as piping if possible. Plug or cap to be secure but removable, threaded or non-threaded.

C. Box Size: As required to provide access and allow easy removal and reinstallation of plug or cap.

D. Box Types:
   2. Traffic Areas: Portland cement concrete box and box cover or steel or cast iron cover, heavy duty, both box and cover to be rated for AASHTO H20 loading.

E. Box Cover Markings: “S.D.,” unless otherwise specified.

F. Available Manufacturers: Subject to compliance with requirements, box manufacturers offering products that may be incorporated into the Project include, but are not limited to, the following:
   1. Associated Concrete Products, Inc. (Santa Ana, California) (Tel. 714-557-7470).
   2. Brooks Products Inc. (El Monte, California) (Tel. 818-443-3017).
   3. Christy Concrete Products, Inc. (Fremont, California) (Tel. 800-486-7070).

2.5 CURB INLETS, CATCH BASINS, DROP INLETS, JUNCTION STRUCTURES, AREA DRAINS, ETC.

A. General: Size, shape, configuration, depth, etc. of structure and frame, grate, or cover shall be as indicated.

B. Portland Cement Concrete and Reinforcing: Section 03301.

C. Precast Structure: Rate for AASHTO H20 loading in traffic areas.

D. Steps: ASTM C 478 or AASHTO M 199. Manufacture from deformed, ½-inch steel reinforcement rod complying with ASTM A 615 and encased in polypropylene complying with ASTM D4101. Include pattern designed to prevent lateral slippage off step. Acceptable manufacturer is Hanson Concrete Products, (Milpitas, CA) (Tel 408-262-1091).

E. Frames, Grates and Covers: Caltrans Standard Specification Section 75-1.02, 75-1.03 and 75-1.05.
   1. Galvanize steel frames, grates and covers.
   2. Grates and covers shall be non-rocking.
   3. Rate for AASHTO H20 loading in traffic areas.
2.6 MANHOLES

A. General: Size, shape, configuration, depth, etc. of manhole and frame and cover shall be as indicated.

B. Portland Cement Concrete and Reinforcing:
   1. Pouredin-Place Portion: Section 03301.
   2. Precast Portion: ASTM C 478. Rate for AASHTO H20 loading in traffic areas.

C. Frames and Covers: As indicated and in accordance with Caltrans Standard Specification Section 75-1.02.

D. Steps: Manufacture from deformed, ½-inch steel reinforcement rod complying with ASTM A615/A 615M and encased in polypropylene complying with ASTM D4101. Include pattern designed to prevent lateral slippage off step.

E. Frames and Covers: As indicated and in accordance with Caltrans Standard Specification Section 75-1.02.

2.7 JOINT SEALANT FOR PRECAST STRUCTURES AND MANHOLES

   1. Use to seal around pipes at connections to structures and manholes. Also use to seal joints between precast sections of structures and manholes.

B. Gaskets: Preformed flexible rubber or plastic gasket.
   2. Plastic Gaskets: Federal Specification SS-S-00210 (GSA-FSS), Type I, Rope Form; or alternate standard which may exist. Acceptable material is “Ram-Nek” as manufactured by the K. T. Snyder Company (Houston TX) or equal.

2.8 POLYMER-CONCRETE TRENCH DRAINS

A. General: Modular system of precast, polymer-concrete channel sections, grates, and appurtenances; designed so grates fit into channel recesses without rocking or rattling. Include number of units required to form total length required.

B. Include the following components:
   1. Channel Sections: Interlocking-joint, precast modular units with end caps. Inside width as indicated with deep, rounded bottom, with built in slope or flat invert as indicated and outlets in number, sizes, and locations indicated. Include extension sections necessary for required depth.
   2. Frame and Grate: Gray iron, ductile iron or galvanized steel as indicated. Where drain is located in traffic areas, rate for AASHTO H20 loading.

C. Locking Mechanism: Manufacturer’s standard device for securing grates to channel.
sections.

D. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Project include, but are not limited to, the following:
1. “Polydrain” by ABT Inc. (Troutman, NC) (Tel 704-528-9806).
2. “ACO Drain” by ACO Polymer Products Inc. (Chardon, OH) (Tel. 800-543-4764).

2.9 METAL, CONCRETE OR PLASTIC FLARED END SECTIONS

A. General: Caltrans Standard Specification Section 70-1.02C and Caltrans Standard Plan D94A and D94B.

2.10 SLOPE PROTECTION

   1. Class:

B. Concrete/Shotcrete Slope Protection: Caltrans Standard Specification Section 72-4.03.
   2. Welded Wire Fabric: Caltrans Standard Specification Section 52-1.02C. Use 6 x 6-W1.4 xW1.4 unless otherwise indicated.

   1. Class:

D. Sacked Concrete Slope Protection.
   1. Concrete: Section 03301, Class C.
   2. Sacks: 10 ounce burlap measuring approximately 19.5-inches by 36 inches when empty and laid flat.

2.11 CONCRETE/SHOTCRETE DITCH LINING

A. General: Caltrans Standard Specification Section 72-4.03.
   2. Welded Wire Fabric: Caltrans Standard Specification Section 52-1.02C. Use 6 x 6-W1.4 xW1.4 unless otherwise indicated.

2.12 PRE-SLOPED CHANNEL DRAINS

B. Dura Slope Channel Drain:
1. Description: 6-5/8-inch wide trench drain system.
   b. Built-In Slope: 0 percent.
   c. Inside Diameter: 4 inches.
   d. Bottom Radius: 2 inches.
   e. Each Modular Channel Section: 4-feet long. Molded bottom outlet.
   f. Pre-Installed Pro Fit Locking System: Locks grate to integral frame.
   g. Leve Loc Integral Rebar Supports: Located at 24-inch intervals along each side of channel contain internal protruding knob to grip No.4 rebar to provide channel height adjustment during installation.
   h. Dura Loc Tongue-and-Groove Ends: Connect to allow for precise fit and straight channel runs.
2. 6.35-Inch Deep Neutral Dura Slope Channel:
   a. Part Number: DS-097N.

C. Channel Grates:
1. Dura Slope 2-Foot Ductile Iron Grate:
   b. Description: 2-foot, heavy-duty, ductile iron, channel grate.
   c. Grate Openings: 5/16 inch by 4-11/16 inches.
   d. Open Surface Area: 15.27 square inches per foot.
   e. Inlet Capacity: 20.00 gpm per foot.
   f. Load: 326 to 575 psi. H-20 rated at speeds less than 20 mph.
   g. Color: Black.

D. Accessories:
1. Pro Fit Grate Lock:
   a. Part Number: DS-122.
2. Universal End Cap Screws:
   a. Part Number: DS-123.
3. Universal End Cap:
4. Universal End Outlet:
   a. Part Number: DS-127.
5. Bottom Outlet Adapter:
   a. Part Number: DS-126.
6. Grate Screws:
   a. Part Number: 629.
PART 3 EXECUTION

3.1 PIPE INSTALLATION

A. General: Install pipe, fittings, and appurtenances utilizing best practices, manufacturer’s instructions, and in accordance with Section 6 and 7 of ASTM D 2321 for plastic pipe, Caltrans Standard Specification Section 65-1.07 for reinforced concrete pipe, Caltrans Standard Specification Sections 66-1.045 and 66-105 for corrugated metal pipe and chapter 11.3.3 of AWWA M41 for cast iron and ductile iron pipe.

B. Pipe Depth and Trench Configuration: Conform to typical trench section(s) indicated.

C. Excavation, Bedding, Backfill, and Compaction: Section 2310.

D. Handling: Carefully handle during loading, hauling, unloading and placing operations to avoid breakage or damage. Use strap type slings for lifting and placing; no chains or hooks will be permitted. Comply with manufacturer’s recommendations.

E. Laying: Before lowering pipe into the trench, remove all stakes, debris, loose rock and other hard materials from the bottom of the trench. Lay accurately in conformance with lines and grades indicated. Start laying the pipeline at the low end and proceed upstream. Lay bell and spigot pipe with the bell end facing upstream. Lay pipe on a bed prepared by handwork, dug true to grade. Furnish firm bearing for pipe throughout its entire length with bell holes provided at the ends of each pipe length of sufficient size to permit making up the particular type of joint being used. Adjust pipe to line and grade by scraping away or filling and tamping material under the body of the pipe for the entire pipe length and not by blocking or wedging. After final positioning, hold pipe in place in trench with backfill material placed equally on both sides of the pipe at as many locations as required to hold the pipe section in place.

F. Curved Alignment: When necessary to conform to the alignment specifically indicated, lay pipe on a curved alignment by means of asymmetrical closure of joints or bending of the pipe barrel. Use shorter lengths of pipe than the standard length if necessary to achieve curvature specified. Do not exceed the recommendations of the pipe manufacture for deflections at the joints or pipe bending.

G. Closure: Close open ends of pipes and appurtenance openings at the end of each days work or when work is not in progress.

3.2 INSTALLATION OF PIPE ANCHORS

A. Install at location, configuration and details shown on the Plans.

3.3 SPECIAL PIPE COUPLINGS

A. General: Use where required to join piping and no other appropriate method is specified.
Do not use instead of specified joining methods.

B. Installation: Manufacturers instructions.

3.4 CLEANOUT INSTALLATION

A. General: Install as indicated.

3.5 INSTALLATION OF CURB INLETS, CATCH BASINS, DROP INLETS, JUNCTION STRUCTURES, AREA DRAINS, ETC. AND MANHOLES

A. Excavation, Bedding, Backfill, and Compaction: Section 2310.

B. Poured in Place Structures: Install as indicated and Caltrans Standard Specification Section 51.
   1. Shape bottoms to convey flows as indicated.

C. Precast Structures: Install as indicated.
   1. Seal all joints and pipe entrances and exits.
   2. Place concrete in bottom and shape to convey flows as indicated.

3.6 POLYMER-CONCRETE TRENCH DRAIN INSTALLATION

A. Excavation, Bedding, Backfill, and Compaction: Section 2310.

B. Install: As indicated and in accordance with the manufacturer’s instructions.

3.7 CONCRETE OR PLASTIC FLARED END SECTION INSTALLATION

A. Install: As indicated.

3.8 SLOPE PROTECTION PLACEMENT

A. Rock Slope Protection: Caltrans Standard Specification Section 72-2.03 and as indicated.
   1. Use Method B Placement unless otherwise indicated.

B. Concrete/Shotcrete Slope Protection: Caltrans Standard Specification Section 72-4.02 and 72-4.04.

C. Concreted-Rock Slope Protection: Caltrans Standard Specification Section 72-5.03 and 72-5.04.
   1. Use Method B Placement unless otherwise indicated.

D. Sacked Concrete Slope Protection.
   1. Detailed configuration: As indicated.
   2. Use one cubic foot of concrete per sack.
3. Locate headers and stretchers as indicated.
5. Stretchers: Folded ends are not to be adjacent.
6. Place no more than four vertical courses until initial set has taken place in first course.

3.9 CONCRETE/SHOTCRETE DITCH LINING PLACEMENT

A. Concrete/Shotcrete Slope Protection: Caltrans Standard Specification Section 72-4.02 and 72-4.04.

3.10 PRE-SLOPED CHANNEL DRAIN INSTALLATION

A. Install pre-sloped channel drain system in accordance with manufacturer's instructions at locations indicated on the Drawings.
B. Excavate trench to ensure proper bedding of concrete beneath and on both sides of channel.
C. Install top of drain system level and to proper elevation.
D. Ensure directional flow arrows located on bottom of channel are pointing in direction of flow, toward catch basin and/or evacuation outlet.
E. Ensure catch basin is at required elevation and location to drain system.
F. Apply silicon sealant to seal joints of drain system.
G. Install and tape grates before placing concrete.
H. Concrete:
   1. Place concrete beneath and on both sides of drain system.
   2. Ensure concrete has a minimum compressive strength of 3,500 psi at 28 days.
   3. Concrete shall be as specified in Section 03300.
I. Recess top of drain system to be 1/8 inch below concrete finish grade.

END OF SECTION
SECTION 02725
SUBDRAINAGE SYSTEMS

PART 1 - GENERAL

1.01 RELATED REQUIREMENTS

A. Section 07115, Sheet Waterproofing

1.02 SUBMITTALS

A. Comply with pertinent provisions of Division 1.

B. Submit manufacturer's descriptive literature and recommended method of installation.
   1. Drainage Panels
   2. Filter Fabric
   3. Drain Pipe

C. Submit manufacturer's certification that products meet specification requirements.

D. Submit certification from manufacturer that installer is an approved applicator of the specified materials.

1.03 DELIVERY, STORAGE AND HANDLING

A. Material shall be delivered in original packages bearing the manufacturer's name.

B. The fabric shall not be exposed to direct sunlight during its storage and installation longer than the time of one week.

C. All material shall be stored and handled in a manner which will prevent damage.

D. Material shall be stored in original containers and shall be clearly marked with manufacturer's name.

1.04 JOB CONDITIONS

A. Where used in conjunction with a waterproofing membrane, the drainage panels shall be installed by methods approved by the membrane manufacturer.

B. The outfall for any drainage pipe used with the drainage panels shall be coordinated with the site storm drain system.

PART 2 - PRODUCTS

2.01 MATERIALS

A. Drainage Panels: Prefabricated drainage panels shall be a composite system consisting of a drainage fabric bonded to a three-dimensional, highly impact-resistant plastic core, "Jdrain 400", by JDR Enterprises, Inc., "Mirafi G100N", by Mirafi, Inc., or equal.
B. Membrane Waterproofing: Specified in Section 07115, "Liquid Applied Waterproofing".

C. Drain Pipe: Flexible or rigid perforated plastic pipe of the diameter shown in the plans but minimum 4" diameter. Accessories may include concrete nails, mastic adhesive, or metal stick clips as recommended by the manufacturer.

D. Filter Fabric: Mirafi N-Series Non-Woven Polypropylene Geotextiles, by Mirafi, Inc., or equal.

PART 3 - EXECUTION

3.01 PRECONSTRUCTION CONFERENCE

A. Prior to beginning the installation of the panels, it is the responsibility of the Contractor to convene a meeting at the job site with a representative of the panel manufacturer and any other contractors involved with their installation, for the purpose of coordinating and clarifying the installation procedure.

3.02 INSTALLATION

A. Against Completed Walls: Positioning the panel with the filter fabric toward the soil, use a mastic adhesive, self-adhesive metal clips, or similar method, subject to approval of the membrane manufacturer.

B. Panel Overlaps: Peel the fabric back from the attached panel to expose 3" of core. Overlap the core of the next panel by 2" and interlock. Reattach the fabric to completely cover the core overlap. Shingle each course, overlapping both the core and the fabric in the direction of water flow.

C. Discharge Connections: Install subdrainage material at foundation drainage pipe material in accordance with the manufacturer's recommendations for positive drainage directly to foundation drainage pipe.

   1. Connect drainage pipe to storm drain system piping as indicated.

D. Protrusions: Cut the core around the protrusion, cut an "X" in the fabric, and tape the fabric around the protrusion. Dirt and plastic concrete must not be allowed to infiltrate the core.

E. Filter Fabric: Wrap filter fabric around all gravel backfill as indicated.

3.03 BACKFILLING

A. Place compacted fill within seven days. Avoid damaging the panels with the compactor's hoe exhaust or tamper foot. Replace any damaged fabric or panels.

END OF SECTION
SECTION 02750

ASPHALT CONCRETE PAVEMENT

PART 1  GENERAL

1.1  SECTION INCLUDES

A. Prime coat.
B. Tack coat.
C. Asphalt concrete paving.
D. Asphalt concrete overlay.
E. Speed bumps.
F. Asphalt curbs.
G. Pavement grinding.
H. Adjusting manholes, valves, monument covers and other structures to grade.

1.2  RELATED SECTIONS

A. Section 02646, Pavement Base Courses.

1.3  RELATED DOCUMENTS

B. ASTM:
   8. D 3666: Specifications for Minimum Requirements for Agencies Testing and
Inspecting Bituminous Paving Mixtures.

C. Caltrans Standard Specifications.
   1. Section 39: Asphalt Concrete.
   2. Section 88: Engineering Fabrics.
   4. Section 93: Liquid Asphalts.
   5. Section 94: Asphaltic Emulsions.

1.4 DEFINITIONS


1.5 QUALITY ASSURANCE

A. Testing Agency: Owner’s Representative will engage a qualified independent testing agency to perform field inspections and tests and to prepare test reports.
   1. Testing agency will conduct and interpret tests and state in each report whether tested work complies with or deviates from specified requirements.

B. Additional testing, at Contractor's expense, will be performed to determine compliance of corrected Work with specified requirements.

C. Thickness of Asphalt Concrete: In-place compacted thickness of asphalt courses will be determined according to ASTM D 3549.

D. Surface Smoothness: Finished surface of each asphalt course will be tested for compliance with smoothness tolerances.

E. In-Place Density: Samples of uncompacted paving mixtures and compacted pavement will be secured by testing agency according to ASTM D 979.
   1. Reference maximum theoretical density will be determined by averaging results from 4 samples of hot-mix asphalt-paving mixture delivered daily to site, prepared according to ASTM D 2041, and compacted according to job-mix specifications.
   2. In-place density of compacted pavement may be determined by testing core samples according to ASTM D 1188 or ASTM D 2726.
      a. One core sample may be taken for every 1000 sq. yd. or less of installed pavement, but in no case will fewer than 3 cores be taken.
      b. Field density of in-place compacted pavement may also be determined by nuclear method according to ASTM D 2950 and correlated with ASTM D 1188 or ASTM D 2726.

1.6 SUBMITTALS

A. Follow submittal procedure outlined in Section 02000.
B. Job-Mix Designs: Certificates signed by manufacturers certifying that each asphalt concrete mix complies with requirements.

C. Material Certificates: Certificates signed by manufacturers certifying that each material complies with requirements.

1.7 PROJECT CONDITIONS

A. Environmental Limitations:
1. Prime Coat: Minimum surface temperature of 60 deg F at application.
2. Tack Coat: Minimum surface temperature of 60 deg F at application.
3. Asphalt Base Course: Minimum surface temperature of 40 deg F and rising at application.
4. Asphalt Surface Course: Minimum surface temperature of 60 deg F at application.
5. Reinforcing Fabric: Air temperature is 50 deg F and rising and pavement temperature is 40 deg F and rising.

PART 2 PRODUCTS

2.1 ASPHALT CONCRETE

A. Caltrans Standard Specifications Section 39, Type B.

B. Asphalt Materials:
1. Asphalt: Caltrans Standard Specification Section 92, steam refined paving asphalt, Grade AR 4000.


F. Sand: ASTM D 1073, Grade No. 2 or 3.

PART 3 EXECUTION

3.1 EXAMINATION

A. Verify that subgrade is dry and in suitable condition to support paving and imposed loads.

B. Proof-roll subbase using heavy, pneumatic-tired rollers to locate areas that are unstable or that require further compaction.
C. Notify Owner’s Representative in writing of any unsatisfactory conditions. Do not begin paving until these conditions have been satisfactorily corrected.

3.2 PAVEMENT GRINDING

A. Clean existing paving surface of loose or deleterious material immediately before pavement grinding.

B. Grind conforms as indicated.

3.3 SOIL STERILANT

A. Furnish and apply to areas indicated in accordance with Section 02300.

3.4 SURFACE PREPARATION FOR AGGREGATE BASE MATERIALS

A. General: Immediately before placing asphalt materials remove loose and deleterious material from substrate surfaces and ensure that prepared subgrade is ready to receive paving according to the Caltrans Standard Specification Section 39-4.01.

B. Prime Coat: Apply uniformly over surface of compacted-aggregate base according to the Caltrans Standard Specification Section 39-4.02. Apply enough material to penetrate and seal, but not flood, surface. Allow prime coat to cure for 24 hours minimum.
   1. If prime coat is not entirely absorbed within 8 hours after application, spread excess prime coat with hand tools and broadcast sand over surface to blot excess asphalt. Use just enough sand to prevent pickup under traffic. Remove loose sand by sweeping before pavement is placed and after volatiles have evaporated.
   2. Protect primed substrate from damage until ready to receive paving.

C. Tack Coat: Apply uniformly to all vertical surfaces against which asphalt concrete is to be placed, including existing surfaces of previously constructed asphalt or portland cement concrete paving and to surfaces abutting or projecting into new asphalt pavement, according to the Caltrans Standard Specification Section 39-4.02.
   1. Allow tack coat to cure undisturbed before paving.
   2. Avoid smearing or staining adjoining surfaces, appurtenances, and surroundings. Remove spillages and clean affected surfaces.

3.5 SURFACE PREPARATION FOR PAVEMENT AT ASPHALT CONCRETE OVERLAYS

A. Pavement Irregularities: Level with asphalt concrete, Type B, No. 4 maximum.

B. Pavement Cracks:
   1. Less than ¼-inch wide: Clean of all dirt by compressed air jet, spray and seal with RS-1 asphaltic emulsion.
2. Wider than ¼-inch: Clean of all dirt by compressed air jet, spray and seal with RS-1 asphaltic emulsion and skin patch.

C. Clean surface of all material, such as leaves, dirt, sand, gravel, water and vegetation prior to applying binder of paving asphalt to existing surface.

3.6 PAVEMENT REINFORCING FABRIC

A. Protect from exposure to ultraviolet rays until placed.

B. Reject rolls with broken or damaged cores, or factory wrinkled fabric that prevents wrinkle free placement.

C. Place with binder of paving asphalt in accordance with Section 39-4.03 of Caltrans Standard Specifications.

3.7 ASPHALT CONCRETE SPREADING AND COMPACTING EQUIPMENT

A. Spreading Equipment: Caltrans Standard Specification Section 39-5.01.


3.8 ASPHALT CONCRETE PLACEMENT

A. Place, spread and compact asphalt concrete to required grade, cross section, and thickness according to the Caltrans Standard Specification Sections 39-6.01, 39-6.02 and 39-6.03.

B. Promptly correct surface irregularities in paving course behind paver. Use suitable hand tools to remove excess material forming high spots. Fill depressions with hot asphalt to prevent segregation of mix; use suitable hand tools to smooth surface.

3.9 JOINTS

A. Construct joints to ensure continuous bond between adjoining paving sections according to the Caltrans Standard Specification Sections 39-6.01 and 39-6.02.

1. Construct joints free of depressions with same texture and smoothness as other sections of asphalt course.

2. Clean contact surfaces and apply tack coat.

3. Offset longitudinal joints in successive courses a minimum of 6 inches.

4. Offset transverse joints in successive courses a minimum of 24 inches.

5. Compact joints as soon as asphalt concrete will bear roller weight without excessive displacement.
3.10 COMPACTION

A. General: Begin compaction as soon as placed hot-mix paving will bear roller weight without excessive displacement. Compact according to the Caltrans Standard Specification Sections 39-6.01 and 39-6.03.

B. Compaction Requirements: Average Density to be 92 percent of reference maximum theoretical density according to ASTM D 2041, but not less than 90 percent nor greater than 96 percent.

C. Finish Rolling: Finish roll paved surfaces to remove roller marks while asphalt is still warm.

D. Edge Shaping: While surface is being compacted and finished, trim edges of pavement to proper alignment. Bevel edges while still hot, with back of rake or smooth iron. Compact thoroughly using tamper or other satisfactory method.

E. Repairs: Remove paved areas that are defective or contaminated with foreign materials and replace with fresh asphalt. Compact by rolling to specified density and surface smoothness.

F. Protection: After final rolling, do not permit vehicular traffic on pavement until it has cooled and hardened. Erect barricades to protect paving from traffic until mixture has cooled enough not to become marked.

3.11 ASPHALT CURBS

A. Construction: Place over compacted surfaces according to Caltrans Standard Specification Section 39-7.01 as specified for dikes. Apply a light tack coat prior to construction, unless pavement surface is still tacky and free of dust.

B. Shape: Place asphalt concrete to curb cross section indicated.

3.12 SPEED BUMPS

A. Construct speed bumps over compacted pavement surfaces according to Caltrans Standard Specification Section 39-6. Apply a light tack coat prior to construction, unless pavement surface is still tacky and free of dust.

B. Place asphalt concrete by hand using a template/screed designed to result in speed bump cross-section indicated after compaction.

C. Compact speed bumps with 8 ton static roller.
3.13 ADJUSTING MANHOLES, VALVES, MONUMENT COVERS AND OTHER STRUCTURES TO GRADE

A. Remove pavement, using vertical cuts, as needed to remove frame and provide for concrete collar. Do not damage adjacent pavement.
   1. Circular Covers: Cut circle with radius 6 inches larger than cover and concentric with cover.
   2. Rectangular Covers: Cut rectangle 6 inches larger than cover on all sides.

B. Install grade rings or blocking as needed to raise cover to finish grade.

C. Pour concrete collar:
   1. Bottom of Collar: Top of existing collar or 6 inches below top of proposed collar, whichever is at a higher elevation.
   2. Top of Collar: Bottom of existing asphalt pavement.
   3. Apply tack coat to all exposed surfaces.
   4. Fill excavation with asphalt concrete and, while still hot, compact flush with adjacent surface.

3.14 INSTALLATION TOLERANCES

A. Asphalt Pavement:
   1. Course thickness and surface smoothness within the tolerances as specified in the Caltrans Standard Specification Sections 39-6.01, 39-6.02 and 39-6.03.
   2. Total Thickness: Not less than indicated.

B. Trench Patch:
   1. Compacted surface: Within 0.01 foot of adjacent pavement.
   2. Do not create ponding.

C. Adjust Covers:
   1. Compacted surface: Up to 0.01 foot higher, and no lower, than adjacent pavement.
   2. Do not create ponding.

END OF SECTION
SECTION 02751

PORTLAND CEMENT CONCRETE PAVEMENT
(UNDOWELED TRANSVERSE WEAKENED PLANE JOINTS)

PART 1  GENERAL

1.1  SECTION INCLUDES

A. Furnishing, placing, spreading, compacting and shaping portland cement concrete pavement with undowedeled transverse weakened plane joints, for vehicular traffic.

B. Form construction and use in placing portland cement concrete pavement.

C. Joints for portland cement concrete pavement.

D. Finishing portland cement concrete pavement.

E. Curing and protecting portland cement concrete pavement.

1.2  RELATED SECTIONS

A. 02320, Pavement Base Courses.

B. 03301, Portland Cement Concrete.

1.3  RELATED DOCUMENTS


B. AASHTO Standard Specifications
   1. T 53: Softening Point of Bitumen (Ring-and-Ball Apparatus).

C. ASTM Standards
   1. A 615: Deformed and Plain Billet-Steel Bars for Concrete Reinforcement.
   2. A 775: Epoxy Coated Reinforcing Steel Bars.
   3. A 934: Epoxy-Coated Prefabricated Steel Reinforcing Bars.
   6. D 2835: Lubricant for Installation of Preformed Compression Seals in Concrete Pavements.
   7. D 3405: Joint Sealants, Hot Poured, for Concrete and Asphalt Pavements.
   8. D 3963: Fabrication and Jobsite Handling of Epoxy-Coated Reinforcing Steel.

D. Caltrans Standard Specifications:
1. Section 40, Portland Cement Concrete Pavement.
2. Section 52, Reinforcement.
3. Section 90, Portland Cement Concrete.
4. Section 95, Epoxy.

E. Caltrans Standard Plans:
2. Plan A35C: Portland Cement Concrete Pavement Joint and End Anchor Details.

1.4 DEFINITIONS

A. AASHTO: American Association of State Highway and Transportation Officials.


1.5 QUALITY ASSURANCE

A. Manufacturer Qualifications: Manufacturer of ready-mixed concrete products complying with ASTM C 94 requirements for production facilities and equipment.
1. Manufacturer must be certified according to the National Ready Mix Concrete Plant Certification Program.

B. Installer Qualification: An experienced installer who has completed pavement work 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.

C. Source Limitations: Obtain each type or class of cementitious material of the same brand from the same manufacturer’s plant and each aggregate from one source.

1.6 SUBMITTALS

A. Follow submittal procedure outlined in Section 02000.

B. Design Mixes: For each concrete pavement mix. Include alternate mix designs when characteristics of materials, project conditions, weather, test results or other circumstances warrant adjustments.

C. Material Certificates: Signed by manufacturers certifying that each of the following materials complies with requirements.
1. Cementitious materials and aggregates.
2. Steel reinforcement and reinforcement accessories.
3. Admixtures.
4. Curing compound.
5. Applied finish material.
7. Joint filler.
10. Epoxy.

PART 2 PRODUCTS

2.1 PORTLAND CEMENT CONCRETE

A. General: Section 03301..

2.2 TIE BARS

A. Deformed reinforcing steel bars conforming to the requirements of ASTM Designation A 615/A (615M), Grade 40 or 60 (Grade 300 or 420).

B. Epoxy-coat in conformance with the provisions in Section 52-1.02B of Caltrans Standard Specifications, except that references made to ASTM Designation D 3963/D 3963M shall be deemed to mean ASTM Designation A 934/A 934M or A 775/775M.

C. Do not bend tie bars.

2.3 EPOXY

A. Bond tie bars to existing concrete with epoxy resin conforming to Section 95-2.03, "Epoxy Resin Adhesive for Bonding New Concrete to Old Concrete," of the Caltrans Standard Specifications.

2.4 SILICONE JOINT SEALANT

A. Furnish low modulus silicone joint sealant in a one-part silicone formulation. Do not use acid cure sealants. Compound to be compatible with the surface to which it is applied and conform to the following requirements:
### Portland Cement Concrete Pavement

<table>
<thead>
<tr>
<th>Specification</th>
<th>Test Method</th>
<th>Requirement</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tensile stress, 150% elongation, 7-day cure at 25°C±1°C and 45% to 55% R.H.</td>
<td>ASTM D 412 (Die C)</td>
<td>310 kPa max.</td>
</tr>
<tr>
<td>Flow at 25°C±1°C</td>
<td>ASTM C 639a</td>
<td>Shall not flow from channel</td>
</tr>
<tr>
<td>Extrusion Rate at 25°C±1°C</td>
<td>ASTM C 603b</td>
<td>75-250 g/min.</td>
</tr>
<tr>
<td>Specific Gravity</td>
<td>ASTM D 792 Method A</td>
<td>1.01 to 1.51</td>
</tr>
<tr>
<td>Durometer Hardness, at -18°C, Shore A, cured 7 days at 25°C±1°C</td>
<td>ASTM C 661</td>
<td>10 to 25</td>
</tr>
<tr>
<td>Ozone and Ultraviolet Resistance, after 5000 hours</td>
<td>ASTM C 793</td>
<td>No chalking, cracking or bond loss</td>
</tr>
<tr>
<td>Tack free at 25°C±1°C and 45% to 55% R.H.</td>
<td>ASTM C 679</td>
<td>Less than 75 minutes</td>
</tr>
<tr>
<td>Elongation, 7 day cure at 25°C±1°C and 45% to 55% R.H.</td>
<td>ASTM D 412 (Die C)</td>
<td>500 percent min.</td>
</tr>
<tr>
<td>Set to Touch, at 25°C±1°C and 45% to 55% R.H.</td>
<td>ASTM D 1640</td>
<td>Less than 75 minutes</td>
</tr>
<tr>
<td>Shelf Life, from date of shipment</td>
<td>—</td>
<td>6 months min.</td>
</tr>
<tr>
<td>Bond, to concrete mortar-concrete briquets, air cured 7 days at 25°C±1°C</td>
<td>AASHTO T 132c</td>
<td>345 kPa min.</td>
</tr>
<tr>
<td>Movement Capability and Adhesion, 100% extension at -18°C after, air cured 7 days at 25°C±1°C, and followed by 7 days in water at 25°C±1°C</td>
<td>ASTM C 719d</td>
<td>No adhesive or cohesive failure after 5 cycles</td>
</tr>
</tbody>
</table>

Notes:  
- a. ASTM Designation: C 639 Modified (15 percent slope channel A).  
- b. ASTM Designation: C 603, through 3-mm opening at 345 kPa.  
- c. Mold briquets in conformance with the requirements in AASHTO Designation: T 132, sawed in half and bonded with a 1.5 mm maximum thickness of sealant and tested in conformance with the requirements in AASHTO Designation: T 132. Briquets shall be dried to constant mass at 100 ± 5°C.  
- d. Movement Capability and Adhesion: Prepare 305 mm x 25 mm x 75 mm concrete blocks in conformance with the requirements in ASTM Designation: C 719. A sawed face shall be used for bond surface. Seal 50 mm of block leaving 12.5 mm on each end of specimen unsealed. The depth of sealant shall be 9.5 mm and the width 12.5 mm.  
- e. R.H. equals relative humidity.

**B.** Formulate the silicon joint sealant to cure rapidly enough to prevent flow after application on grades of up to 15 percent.

**C.** Furnish to the Owner’s Representative a Certificate of Compliance. Accompany certificate with a certified test report of the results of the required tests performed on the sealant material within the previous 12 months prior to proposed use. Provide the certificate and accompanying test report for each lot of silicone joint sealant prior to use on the project.

### 2.5 ASPHALT RUBBER JOINT SEALANT

**A.** Conform to the requirements of ASTM Designation: D 3405 as modified herein or to the following:  
1. Provide a mixture of paving asphalt and ground rubber. Ground rubber to be vulcanized or a combination of vulcanized and de-vulcanized materials ground so that 100 percent will pass a 2.36-mm sieve and contain not less than 22 percent ground rubber, by mass. Modifiers may be used to facilitate blending.  
2. The Ring and Ball softening point shall be 57°C minimum, when tested in
3. Provide asphalt rubber sealant material capable of being melted and applied to cracks and joints at temperatures below 204°C.

B. The penetration requirement of Section 4.2 of ASTM Designation: D 3405 do not apply. The required penetration at 25°C, 150g, 5s, shall not exceed 120.

C. The resilience requirement of Section 4.5 of ASTM Designation: D 3405 do not apply. The required resilience, when tested at 25°C, shall have a minimum of 50 percent recovery.

D. Accompany each lot of asphalt rubber joint sealant shipped to the job site, whether as specified herein or conforming to the requirements of ASTM Designation D 3405, as modified herein, by a Certificate of Compliance, storage and heating instructions and precautionary instructions for use.

E. Heat and place in conformance with the manufacturer's written instructions and the details shown on the plans. Provide manufacturer's instructions to the Owner’s Representative. Do not place when the pavement surface temperature is below 10°C.

2.6 PREFORMED COMPRESSION JOINT SEALANT

   1. Number of cells: 5 or 6.
   3. Install compression seals along with lubricant adhesive according to the manufacturer's recommendations. Submit manufacture's recommendations to the Owner’s Representative.

B. Accompany each lot of compression seal and lubricant adhesive by a Certificate of Compliance, storage instructions and precautionary instructions for use. Also submit the manufacturer's data sheet with installation instructions and recommended model or type of preformed compression seal for the joint size and depth as shown on the plans. Show evidence that the selected seal is being compressed at level between 20 and 50 percent at all times for the joint width and depth shown on the plans.

2.7 BACKER RODS

A. Provide backer rods that have a diameter prior to placement at least 25 percent greater than the width of the saw cut after sawing and are expanded, crosslinked, closed-cell polyethylene foam that is compatible with the joint sealant so that no bond, adverse reaction occurs between the rod and sealant. In no case use a hot pour sealant that will melt the backer rod. Submit a manufacturer's data sheet verifying that the backer rod is compatible with the sealant to be used.
PART 3  EXECUTION

3.1 WATER SUPPLY
A. Conform to Section 40-1.02 of Caltrans Standard Specifications.

3.2 SUBGRADE
A. Conform to Section 40-1.04 of Caltrans Standard Specifications.

3.3 SOIL STERILANT
A. Furnish and apply to areas indicated in accordance with Section 02300.

3.4 PLACING
A. Conform to Section 40-1.06 of Caltrans Standard Specifications.

3.5 SPREADING COMPACTING AND SHAPING
A. Conform to Section 40-1.07 of Caltrans Standard Specifications.


3.6 INSTALLING TIE BARS
A. Install at longitudinal contact joints, longitudinal weakened plane joints, and transverse contact joints as shown on the plans. In no case, shall any consecutive width of new portland cement concrete pavement tied together with tie bars exceed 15 meters. In no case shall tie bars be used at a joint where portland cement concrete and asphalt concrete pavements abut.

B. Tie bars shall be installed at longitudinal joints by one of the 3 following methods:
1. Drilling and bonding in conformance with the details shown on the plans. Provide a two-component, epoxy-resin, conforming to the requirements of ASTM Designation: C 881, Type V. Grade 3 (Non-Sagging), Class shall be as follows:

<table>
<thead>
<tr>
<th>Temperature of Concrete</th>
<th>Required Class of Epoxy Resin</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lower than 40°F (4.5°C)</td>
<td>A</td>
</tr>
<tr>
<td>40°F (4.5°C) through 60°F (15.5°C)</td>
<td>B</td>
</tr>
<tr>
<td>Above 60°F (15.5°C)</td>
<td>C</td>
</tr>
</tbody>
</table>
Provide, at least 7 days prior to start of work, a Certificate of compliance and a copy of the manufacturer's recommended installation procedure. The drilled holes shall be cleaned in accordance with the epoxy manufacturer's instructions and shall be dry at the time of placing the epoxy and tie bars. Immediately after inserting the tie bars into the epoxy, the tie bars shall be supported as necessary to prevent movement during the curing and shall remain undisturbed until the epoxy has cured a minimum time as specified by the manufacturer. Tie bars that are improperly bonded, as determined by the Owner’s Representative, will be rejected. If rejected, adjacent new holes shall be drilled, as directed by the Owner’s Representative, and new tie bars shall be placed and securely bonded to the concrete. All work necessary to correct improperly bonded tie bars shall be performed at the Contractor's expense.

2. Insert the tie bars into the plastic slip-formed concrete before finishing the concrete. Inserted tie bars shall have full contact between the bar and the concrete. When tie bars are inserted through the pavement surface, the concrete over the tie bars shall be reworked and refinished to such an extent that there is no evidence on the surface of the completed pavement that there has been any insertion performed. Any loose tie bars shall be replaced by drilling and grouting into place with epoxy as described in method 1 above at the Contractor's expense.

3. By using threaded dowel splice couplers fabricated from deformed bar reinforcement material, free of external welding or machining. Threaded dowel splice couplers shall be accompanied by a Certificate of Compliance and installation instructions. Installation of threaded dowel splice couplers shall conform to the requirements of the manufacturer's recommendations.

3.7 JOINTS

A. Conform to Section 40-1.08 of Caltrans Standard Specifications, Except that tie bars shall be as specified under Part 1, Materials.

1. Transverse Contact Joints: Section 40-1.08A of Caltrans Standard Specifications.
   a. Construct a transverse contact (construction) joint at the end of each day's work, or where concrete placement is interrupted for more than 30 minutes, to coincide with the next weakened plane joint location.
   b. If sufficient concrete has not been mixed to form a slab to match the next weakened plane joint, when an interruption occurs, the excess concrete shall be removed and disposed of back to the last preceding joint. The cost of removing and disposing of any excess concrete shall be at the Contractor's expense. Any excess material shall be become the property of the Contractor and shall be properly disposed of.
   c. A metal or wooden bulkhead (header) shall be used to form the joint. The bulkhead shall be designed to accommodate the installation of tie bars.

2. Weakened Plane Joints: Section 40-1.08B, except that the insert method of forming joints in pavement shall not be used.
3.8 FINISHING

A. Conform to Sections 40-1.09 and 40-1.10 of Caltrans Standard Specifications.

3.9 CURING

A. Conform to Section 40-1.11 of Caltrans Standard Specifications.

3.10 SEALING JOINTS

A. Liquid Joint Sealant Installation.

1. The joint sealant detail for transverse and longitudinal joints, as shown on the plans, shall apply only to weakened plane joints. Construct weakened plane joints by the sawing method. Should grinding or grooving be required over or adjacent to any joint after sealant has been placed, completely remove the joint material and disposed of, and replace at the Contractor's expense. Recess sealant below the final finished surface as shown on the plans.

2. At the Contractor's option, transverse weakened plane joints shall be either Type DSC or Type SSC as shown on the plans. Longitudinal weakened plane joints shall be Type SSC only as shown on the plans.

3. Seven days after the concrete pavement placement and not more than 4 hours before placing backer rods and joint sealant materials, clean the joint walls by the dry sand blast method and other means as necessary to completely remove from the joint all objectionable material such as soil, asphalt, curing compound, paint and rust. After cleaning the joint, remove all traces of sand, dust and loose material from and near the joint for a distance along the pavement surfaces of at least 50 mm on each side of the joint by the use of a vacuum device. Remove surface moisture at the joints by means of compressed air or moderate hot compressed air or other means approved means. Do not use drying procedures that leave a residue or film on the joint wall. Sandblasting equipment shall have a maximum nozzle diameter size of 6 ± 1 mm and a minimum pressure of 0.62-MPa.

4. Install backer rod as shown on the plans. Provide an expanded, closed-cell polyethylene foam backer rod that is compatible with the joint sealant so that no bond or adverse reaction occurs between the rod and sealant. Install backer rod when the temperature of the portland cement concrete pavement is above the dew point of the air and when the air temperature is 4°C or above. Install backer rod when the joints to be sealed have been properly patched, cleaned and dried. Do not use a method of placing backer rod that leave a residue or film on the joint walls.

5. Immediately after placement of the backer rod, place the joint sealant in the clean, dry, prepared joints as shown on the plans. Apply the joint sealant by a mechanical device with a nozzle shaped to fit inside the joint to introduce the sealant from inside the joint.
Apply adequate pressure to the sealant to ensure that the sealant material is extruded evenly and that full continuous contact is made with the joint walls. After application of the sealant recess the surface of the sealant as shown on the plans.

6. Any failure of the joint material in either adhesion or cohesion of the material will be cause for rejection of the joint. Conform the finished surface of joint sealant to the dimensions and allowable tolerances shown on the plans. Rejected joint materials or joint material whose finished surface does not conform to the dimensions shown on the plans shall be repaired or replaced, at the Contractor's expense, with joint material that conforms to the requirements.

7. After each joint is sealed, remove all surplus joint sealer on the pavement surface. Traffic shall not be permitted over the sealed joints until the sealant is tack free and set sufficiently to prevent embedment of roadway debris into the sealant.

B. Preformed Compression Joint Seal Installation

1. The compression seal alternative joint detail for transverse and longitudinal joints, as shown on the plans, shall apply only to weakened plane joints. Construct weakened plane joints by the sawing method. Should grinding or grooving be required over or adjacent to any joint after the compression seal has been placed, completely remove the joint materials and disposed of, and replace at the Contractor's expense. Compression seal shall be recessed below the final finished surface as shown on the plans.

2. At the Contractor's option, transverse weakened plane joints shall be either Type DSC or Type SSC as shown on the plans. Longitudinal weakened plane joints shall be Type SSC only as shown on the plans.

3. Seven days after the concrete pavement placement and not more than 4 hours before placing preformed compression joint seals, the joint walls by the dry sand blast method and other means as necessary to completely remove from the joint all objectionable material such as soil, asphalt, curing compound, paint and rust. After cleaning the joint, remove all traces of sand, dust and loose material from and near the joint for a distance along the pavement surfaces of at least 50 mm on each side of the joint by the use of a vacuum device. Remove surface moisture at the joints by means of compressed air or moderate hot compressed air or other means. Do not use drying procedures that leave a residue or film on the joint wall. Sandblasting equipment shall have a maximum nozzle diameter size of 6 ± 1 mm and a minimum pressure of 0.62-MPa.

3.11 PROTECTING CONCRETE PAVEMENT

A. Conform to Section 40-1.12 of Caltrans Standard Specifications.

END OF SECTION
SECTION 02785

SIGNS, OBJECT MARKERS, TRAFFIC STRIPES, PAVEMENT MARKINGS AND MARKERS

PART 1  GENERAL

1.1 SECTION INCLUDES

A. Removal of existing traffic stripes and pavement markers.
B. Removal of existing signs.
C. Cleaning and sweeping of streets before application of traffic stripes and pavement markings.
D. Materials and application for traffic stripes and pavement markings.
E. Materials and application for pavement markers.
F. Traffic control signs and street name signs.
G. Object markers.

1.2 RELATED SECTIONS

A. Section 02750, Asphalt Concrete Pavement.
B. Section 02751, Portland Cement Concrete Pavement.

1.3 RELATED DOCUMENTS

A. Caltrans Standard Specifications:
   1. Section 56, Signs.
   2. Section 82, Markers and Delineators.
   3. Section 84, Traffic Stripes and Pavement Markings.
   4. Section 85, Pavement Markers.

B. Caltrans Standard Plans:
7. Plan A73B: Markers.


D. The regulations, standards, and tests of the State of California Department of Transportation Materials and Research Division, edition in effect at time of date on plans.

1.4 QUALITY ASSURANCE

A. Deliver certificates showing conformance with this specification to the Owners Representative with each shipment of materials and equipment to the Project site.

1.5 PROJECT CONDITIONS

A. Do not apply traffic striping or pavement markings to the pavement until after approval to proceed has been given by the Owners Representative.

B. Thoroughly cure new asphalt concrete and portland cement concrete before application of stripes, markings or markers.

PART 2 PRODUCTS

2.1 THERMOPLASTIC STRIPES AND MARKING

A. Conform thermoplastic striping and marking materials to Section 84-2.02 of Caltrans Standard Specifications, unless noted otherwise herein or on the Plans.

2.2 PAINTED STRIPES AND MARKINGS

A. Conform painted striping and marking materials to Section 84-3.02 of Caltrans Standard Specifications, unless noted otherwise herein or on the Plans.

2.3 PAVEMENT MARKERS

A. Types: Section 85-1.02 of Caltrans Standard Specifications and as indicated.

B. Sampling, Tolerances and Packaging: Section 85-1.03 of Caltrans Standard Specifications.

C. Material
   1. Non-reflective: Section 85-1.04 of Caltrans Standard Specifications. Retroreflective: Section 85-1.05 of Caltrans Standard Specifications

2.4 TRAFFIC CONTROL SIGNS
A. General: Section 56-2 of the Caltrans Standard Specifications.

B. Sign Panels: Conform type (regulatory or warning), size, shape and pattern to the State of California, Department of Transportation, Traffic Manual, edition in effect at the date of the Plans. Sign faces to be of reflectorized porcelain enamel.

C. Posts:
   1. Metal: Two (2) inch inside diameter steel pipe. Conform to Section 56-2.02A of Caltrans Standard Specifications, unless otherwise specified.
   2. Wood: Conform to Section 56-2.02B.

D. Mounting Hardware: Section 56-2.02D of Caltrans Standard Specifications, unless otherwise specified.

E. Post Foundations: Portland cement concrete conforming to Section 03301.

2.5 STREET NAME SIGNS

A. Conform to manufacturer, style, size, and shape shown on the Plans.

B. Posts: Two (2) inch inside diameter steel pipe unless noted otherwise on the Plans. Conform to Section 56-2.02A of Caltrans Standard Specifications.


2.6 REFLECTORIZED OBJECT MARKERS

A. Reflectorized Metal Object Markers: Conform to the applicable requirements of Section 82 of Caltrans Standard Specifications for target plates and reflectors, and Caltrans Standard Plan A73A L-2 object markers.

B. Posts: Metal posts conforming to the applicable requirements of Section 82-1.02B of Caltrans Standard Specifications and Caltrans Standard Plan A73B.

C. Mounting Hardware: Conform to the applicable requirements of Section 82-1.02G of Caltrans Standard Specifications.

2.7 STREET SURVEY MONUMENTS

A. General: Conform to Section 81-02 of Caltrans Standard Specifications, except that the marker disk will not be furnished. Marker disk shall be 2-inch diameter solid brass with a 2-3/4-inch shaft, “Lietz No. 525” or equal.
   1. Portland Cement Concrete: Section 03301.
PART 3  EXECUTION

3.1  REMOVAL OF TRAFFIC STRIPES, PAVEMENT MARKINGS AND PAVEMENT MARKERS

A. Where blast cleaning is used for the removal of painted traffic stripes and pavement markings, or for removal of objectionable material, remove the residue, including dust and water, immediately after contact with the surface being treated. Remove by a vacuum attachment operating concurrently with the blast cleaning operation.

B. Where grinding is used for the removal of thermoplastic traffic stripes and pavement markings; remove the residue by means of a vacuum attachment to the grinding machine. Do not allow the residue to flow across or be left on, the pavement.

C. Where markings are to be removed by blast cleaning or by grinding, the removed area shall be approximately rectangular so that no imprint of the removed marking remains on the pavement.

D. Contractor will be responsible for repairing any damage to the pavement during removal of pavement markers. Damage to the pavement, resulting from removal of pavement markers, shall be considered as any depression more than 1/4-inch deep.

3.2  TEMPORARY PAVEMENT MARKERS

A. If permanent pavement markers cannot be installed immediately, and the street or road is to be placed in service, install short term, temporary pavement markers on the new pavement prior to opening the street or road to traffic.

B. Place markers, at a minimum, of 24 feet on centers. or as required by the governmental agency having jurisdiction, in the appropriate colors to delineate centerlines and travel lanes on multi-lane roadways.

3.3  THERMOPLASTIC TRAFFIC STRIPES AND PAVEMENT MARKINGS

A. Apply in conformance with the manufacturer's instructions and the applicable requirements of Section 84-2.04 of Caltrans Standard Specifications and Caltrans Standard Plans A20A through A20D, and A24A through A24E.

3.4  PAINTED TRAFFIC STRIPES AND PAVEMENT MARKINGS

A. Apply in conformance with the manufacturer's instructions and the applicable requirements of Section 84-3.03, 3.04 and 3.05 of Caltrans Standard Specifications and Caltrans Standard Plans A20A through A20D, and A24A through A24E.

3.5  PAVEMENT MARKERS
A. Place in conformance with the requirements of Section 85-1.06 of the Caltrans Standard Specifications.

B. Pavement recesses are not required. Markers shall be installed accurately to the line established by the Engineer. No markers shall be installed until the surface has been approved by the Owner’s Representative.

3.6 TRAFFIC CONTROL SIGNS

A. Install in conformance with Sections 56-2.03 and 2.04 of Caltrans Standard Specifications, Caltrans Standard Plan RS1, the applicable requirements of the State of California Department of Transportation Maintenance Manual and the details shown on the Plans. The horizontal locations shown on Caltrans Standard Plan RS1 shall not be applicable, the horizontal location shall be as shown on the Plans.

B. Portland cement concrete for post foundations shall be of the configuration shown on the Plans.

C. After erection, damage to traffic sign faces shall be touched up or the sign replaced.

3.7 STREET NAME SIGNS

A. Install in accordance with the manufacturer’s instructions and as shown on the Plans.

B. Horizontal location shall be as shown on the Plans.

C. Portland cement concrete for post foundations shall be of the configuration shown on the Plans.

3.8 REFLECTORIZED OBJECT MARKERS.

A. Install in conformance with the requirements of Section 82-1.03 of Caltrans Standard Specifications, except that the metal marker posts shall not be driven in place without prior approval of the Owner’s Representative.

B. Install at locations shown on the Plans.

3.9 PROTECTION

A. Protect the newly installed and traffic stripes and pavement markings from damage until the material has cured.

B. Replace any traffic stripes or pavement markings or markers broken, misaligned or otherwise disturbed prior to opening roadway to traffic.
3.6 RESTORATION OF EXISTING IMPROVEMENTS

A. Existing signs striping or other markings removed or damaged due to the installation of new facilities shall be replaced in kind.

B. Existing landscaping or planting removed, damaged or disturbed due to the installation of traffic control signs or street name signs shall be replaced in kind.

END OF SECTION
PART 1 - GENERAL

1.01 DESCRIPTION

A. The work in this section consists of furnishing, layout and installing an irrigation system complete, including certification of irrigation system installation as required by the State of California Model Water Ordinance described herein.

B. Related work specified elsewhere includes:
   1. Section 02110, PLANT PROTECTION
   2. Section 02300, EARTHWORK.
   3. Section 02900, PLANTING.
   4. Division 16, ELECTRICAL stub-out(s) for controller(s).

1.02 CALIFORNIA MODEL WATER EFFICIENT LANDSCAPE ORDINANCE REQUIREMENTS

A. Contractor shall be familiar with and follow the State of California Model Water Ordinance, California Code of Regulations, Title 23 Waters, Division 2, Department of Water Resources, Chapter 2.7. Also, the Contractor is responsible to follow all local water ordinances.

B. Pursuant to the requirements of the California Model Water Efficient Landscape Ordinance, the Contractor shall submit a Certification of Installation to the Local Jurisdiction / water purveyor as described in the construction documents and these specifications. Certification shall at a minimum include the following documents:

   PART 1. Project Information Sheet
   PART 2. Certification of Installation according to the landscape documentation package.
   PART 3. Irrigation Scheduling and Controller Programming
   PART 4. Schedule of Landscape and Irrigation
   PART 5. Landscape Irrigation Audit Report
   PART 6. Soil Management/Analysis Report with verifying implementation, see Planting Specification for analysis requirements.

1.03 QUALITY ASSURANCE

A. Manufacturer's Specifications: Follow manufacturer's current printed specifications and drawings in all cases where the manufacturers of articles used in the Contract furnish directions covering points not specified or shown in the drawings.
B. Ordinances and Regulations: All local, municipal and state laws, codes and regulations governing or relating to all portions of this work are hereby incorporated into and made a part of these Specifications. Anything contained in these Specifications shall not be construed to conflict with any of the above codes, regulations or requirements of the same. However, when these Specifications and Drawings call for or describe materials, workmanship or construction of a better quality, higher standard, or larger size than is required by the above codes and regulations, the provisions of these Specifications and Drawings shall take precedence. Furnish without extra charge additional materials and labor required to comply with above rules and regulations.

C. References, Codes and Standards:


2. California Environmental Quality Act (CEQA)

3. Water Use Classification of Landscape Species (WUCOLS).


6. CAL-OSHA, title 8, Subchapter 4-Construction Safety Orders and Subchapter 7-General Industry Safety Orders.


8. California Plumbing Code (UPC) published by the Association of Western Plumbing Officials.

9. NFPA 24, Section 10.4, Depth of Cover.

10. Underwriters Laboratories (UL): Electrical wiring, controls, motors and devices, UL listed and so labeled.


D. Furnish without extra charge any additional material and labor when required by the compliance with all above mentioned codes and regulations, though the work be not mentioned in these specifications or shown on the drawings.

E. Experience: Assign a full-time employee to the job as supervisor for the duration of the Contract with a certified landscape technician, irrigation certification through CLCA or minimum of four (4) years experience in landscape irrigation installation.

1. Labor Force: Provide a landscape installation and maintenance force thoroughly familiar with, and trained in, the work to be accomplished to perform the task in a competent, efficient manner acceptable to the Owner's Representative.
F.  Explanation of Drawings:

1. Due to the scale of the Drawings, it is not possible to indicate all piping offsets, fittings, sleeves, etc., which may be required. Carefully investigate the conditions affected all of the work and plan accordingly, and furnish all required fittings. Install system in such a manner to avoid conflicts with planting, utilities and architectural features.

2. Do not install the irrigation system as shown on the Drawings when it is obvious in the field that obstructions, grade differences or discrepancies in arc dimensions exist that might not have been considered in engineering. Bring such obstruction or differences to the attention of the Owner's Representative. Notify and coordinate irrigation Work with applicable contractors for location and installation of piping and sleeves through or under walls, pavement and structures. In the event this notification is not given, the Contractor shall assume full responsibility for any revision necessary.

G. Trench Interference with Tree Root Systems:

1. Where it is necessary to excavate adjacent to existing trees, the Contractor shall comply with Section 02110, PLANT PROTECTION for the protection of existing vegetation.

2. Where Irrigation is shown within the drip line of existing trees, Contractor shall determine in the field where irrigation can be installed without impacting or damaging existing roots. Contractor shall layout exact proposed trench locations or equipment and review locations with the Arborist and Owner. Adjust the system as required to avoid damage to tree roots and as directed by the Arborist and Owner.

3. Excavation within the drip line shall be done by hand only, with no exceptions unless approved or directed by the Arborist or Owner.

4. All roots 2 inch (50mm) and larger in diameter, except directly in the path of pipe or conduit, shall be tunnelled under and shall be heavily wrapped with burlap, to prevent scarring or excessive drying.

5. Where a ditching machine is run close to trees having roots smaller than 2 inch (50 mm) in diameter, the wall of the trench adjacent to the tree shall be hand trimmed, making clean cuts through.

6. The Contractor is responsible for securing the services of a Certified Arborist at no cost to the Owner.

1.04 PROTECTION OF EXISTING STRUCTURES AND UTILITIES

A. The Drawings show, if applicable, existing above and below grade structures and utilities that are known to the Owner. Locate known existing installations before proceeding with construction operations that may cause damage to such installations. Existing installations shall be kept in service where possible and damage to them shall be
repaired with no adjustment of Contract Sum. Verify with Owner if As Built drawings are available.

B. If other structures or utilities are encountered, request Owner's Representative to provide direction on how to proceed with the Work. If a structure or utility is damaged, take appropriate action to ensure the safety of persons and property.

1.05 SUBMITTALS, in accordance with Section 01300.

A. Materials List:

1. Submit required copies of the cut sheets and a complete list of materials proposed for installation, along with any proposed substitutions clearly identified and obtain the Owner Representative's written approval thereof before proceeding. Use only accepted materials and items of equipment.

2. List all materials by manufacturer's name and model number.

3. Submit to Local Water Purveyor with copy to the Owner Certification of Installation as required by the State of California Model Water Ordinance.

B. Substitutions:

1. If the Contractor desires to substitute a product, he shall list each item and note it as a "substitution" and provide the following information:
   a. Descriptive information describing its similarities to the specified product.

2. If the product is approved and, in the opinion of the Owner's Representative, the substituted product does not perform as well as the specified product, the Contractor shall replace it with the specified product at no additional cost to the Owner.

C. Operations and Maintenance Manuals:

1. Prior to the final acceptance of the irrigation system, furnish three (3) individually bound Operation and Maintenance Manuals to the Owner's Representative for use by the Owner. The manuals shall contain complete enlarged drawings, diagrams and spare parts lists of all equipment installed showing manufacturer's name and address. In addition, each Service Manual shall contain the following:
   a. Index sheet indicating the Contractor's name, address and phone number.
   b. Copy of the Landscape Irrigation Audit
   c. Copy of the 12-month irrigation schedule and estimate of annual water consumption
   d. Copies of equipment warranties and certificates.
e. List of equipment with names, addresses and telephone numbers of all local manufacturer representatives.

f. Complete operating and maintenance instructions in sufficient detail to permit operating personnel to understand, operate and maintain all equipment.

g. Parts list of all equipment such as controllers, valves, solenoids and heads.

D. Record Drawings, per Section 01730:

1. Dimension the location of the following items from two (2) permanent points of reference such as building corners, sidewalks, road intersections, etc.:

   a. Connection to existing water lines/meter.
   b. Connection to electrical power.
   c. Gate valves.
   d. Routing of sprinkler pressure lines (a dimension at least every 100 feet and as required to identify all changes in direction and location).
   e. Remote control valves.
   f. Routing of control valves.
   g. Quick coupling valves.
   h. All sleeve locations.
   i. Routing of all control wiring.
   j. Include all invert elevations below 12”.

2. Deliver a reproducible record drawing to the Architect within seven (7) working days before the date of final review. Delivery of the record drawings shall not relieve the Contractor of the responsibility of furnishing required information in the future.

E. Controller Plan:

1. Provide one Irrigation Diagram plan in each controller housing. The plan shall show the area controlled by each valve in different colors and for orientation, any major permanent structure such as buildings and roads.

2. Charts to be waterproof and hermetically sealed between two pieces of transparent 10 mil thick plastic and installed in each controller on the door as accepted by the Owner's Representative no later than the time of the coverage test of the irrigation system.
F. Maintenance Material - supply the following tools to the Owner:

1. Three (3) sets of specialized tools required for removing, disassembling and adjusting each type of sprinkler, valve or other equipment supplied on this project.

2. Two (2) keys for each type of equipment enclosure.

3. Two (2) keys for each type of automatic controller.

4. Two (2) keys for each type of valve (including square type key for valves larger than 2”)

5. Two (2) quick-coupler keys and matching hose swivels for each type of quick-coupling valve installed.

6. All lock keys shall be keyed alike.

1.06 PRODUCT DELIVERY, STORAGE AND HANDLING

A. Furnish and deliver materials in manufacturer's packaging, bearing original legible labeling.

B. The Contractor is cautioned to exercise care in handling, loading, unloading, and storing PVC pipe and fittings. All PVC pipe shall be transported in a vehicle which allows the length of the pipe to lie flat so as not to subject it to undue bending or concentrated external load at any point. Any section of pipe that has been dented, cracked, or otherwise damaged shall be discarded and, if installed, shall be replaced with new piping.

1.07 SEQUENCING AND SCHEDULING

A. Acceptance: Do not install main line trenching prior to acceptance by Owner's Representative of rough grades completed under another Section.

B. Coordination: Coordinate with the work of other sections to insure the following sequence of events:

1. Sleeves and Conduits: Installation of all sleeves and conduits to be located under paving and through walls prior to placement of those materials.

2. Coordinate work schedule with Owner to avoid disruption of landscape maintenance of existing landscaping.

3. Install piping prior to soil preparation (planting soil amendment installation).

1.08 WARRANTY, per Section 017836.

A. In addition to manufacturer's guarantees and warranties, work shall be warranted for one (1) year from date of final acceptance against defects in material, equipment and workmanship. Warranty shall also cover repair of damage to any part of the premises.
resulting from leaks or other defects in materials, equipment and workmanship to the satisfaction of the Owner.

B. Include a copy of the warranty form in the Operation and Maintenance Manual.

1.09 OPERATION

A. Routine: Inspect and adjust all spray heads and control valves including raising or lowering of spray head heights to accommodate plant growth and weather conditions.

B. Controller: Inspect regularly for power interruption and reset clock as required. Adjust station timing to accommodate changes in plant growth and weather conditions.

C. System Failure: Perform all repairs within one (1) operating period. Replacements to match removed products and materials in all respects. Report promptly all damage not resulting from Contractor's operations. Repair all damage caused by Contractor at no expense to Owner.

D. Climate Change: Set and program automatic controllers in response to seasonal requirements and requirements of newly planted materials.

PART 2 - PRODUCTS

2.01 PIPE

A. Pressure Main Line Pipe and Fittings: All PVC fittings shall bear the manufacturer's trademark name, material designation, size, applicable I.P.S. schedule and NSF seal of approval.

B. All main line pipe shall be solvent welded and shall be schedule 40 unless shown otherwise on the Drawings.

1. PVC Pressure Rated Pipe: ASTM D2241 NSF approved Type I, Grade I, solvent welded PVC with an appropriate standard dimension ratio (S.D.R.).

2. PVC Scheduled Pipe: ASTM D1785 NSF approved, Type I, Grade I, solvent welded PVC.


4. Solvent Cement and Primer for PVC solvent-weld pipe and fittings: Type and installation methods prescribed by the manufacturer.

5. Connections between Main Lines and RCVs: Schedule 80 PVC (threaded both ends) nipples and fittings unless required otherwise by local jurisdiction.

6. Valves 2-inch and larger shall be flanged only.

7. Copper pipe shall be Type K or Red Brass where threaded joints are required and Type L otherwise.
9. All lateral line pipe shall be solvent welded and shall be schedule 40 unless shown otherwise on the Drawings.

2.02 CONTROLLER(S):

A. 2-wire controller with rain shutoff switch as shown on Drawings.

B. Provide each irrigation controller with its own independent low voltage common ground wire.

2.03 CONTROLLER ENCLOSURES

A. Wall mounted stainless steel as shown

2.04 CONTROL WIRES

A. Provide control wires as recommended by controller manufacturer.

B. Connections between automatic controllers and the solenoid-operated electric control valves shall be made with direct burial copper wire 14-AWG-UF 600 volt (minimum size). Pilot wires shall be a color other than white, and shall be a different color for each automatic controller with wires sharing a common trench. Common wires shall be white in color, with a different color stripe for each controller with wiring sharing the same common trench. No stripe is required if multiple controller wiring is not present.

C. Size of wire shall conform to the remote control valve manufacturer's specification for control wire sizes, but in no case shall the control wire be smaller than #14. Runs over 2,000 lineal feet shall be #12-AWG-UF 600 volt copper wire.

D. All wire splices are to be made within a valve box, with a copper crimp-type connector, and a “3-M” #DBY splice kit or Rain Bird “DBTC25”.

E. Use continuous control wiring between controllers and remote control valves (no splices).

F. Provide polyurethane tag at valve solenoid control wire that shows the controller number and station number. Also refer to valve box lid identification.

2.05 REMOTE CONTROL VALVE: As shown on Drawings and with the following minimum requirements:

A. Provide decoder at each remote control valve as recommended by 2-wire controller manufacturer.

B. Remote control valves shall be those normally manufactured for irrigation systems and shall have a slow, consistent speed of closure through entire closing operation, including last portion. To ensure this, the effective diaphragm working area/valve seating opening ratio must be a minimum 3 to 1.

C. Shall be mechanically self-cleaning to help prevent diaphragm or solenoid port plugging. To ensure this, the flush rod should be tapered to vary the size of the port opening as the diaphragm raises and lowers, thus allowing trapped material to escape. Rod is to be
finished with a serrated surface to help scrub trapped material out. Screens not acceptable.

D. Shall have removable valve seat so valve can be repaired without removal from irrigation line.

E. Shall have ability to operate manually without the use of wrenches or special keys.

F. Shall have one-piece solenoid that attaches directly to valve without shunts or clips that can be lost.

G. Shall have cross top handle to adjust maximum travel of diaphragm to allow "tuning" of valve and closure.

2.06 BOX FOR REMOTE CONTROL VALVE

A. Rectangular black plastic valve box - Ametek, Carson, Christy, Rain Bird or accepted equal with non-hinged bolt down black colored lid marked "irrigation. Box body shall have knock outs. Do not saw cut body. The minimum size box is as shown on Drawings. Increase box size as required to fit. Valve box lids are to indicate the controller letter and station number of valve as accepted by Owner's Representative. Also refer herein to required polyurethane tag at valve solenoid control wire under Control Wires. Locate the identification in center of the lid. Provide separate box for each valve. Provide H/20 Loading concrete boxes with bolt-down concrete lids for all valves that occur in paved areas.

2.07 SPRAY HEADS

A. Pop-up as shown on drawings and with the following minimum requirements:

1. Shall have approximately 30 psi water pressure coming out of nozzle to prevent "fogging" or misting. Shall have pressure-compensating devices.

2. Shall have ability to prevent low head drainage. Use heads with integral check valves.

2.08 QUICK COUPLER VALVES:

A. Quick coupler valves shall be as shown on drawings.

2.09 ISOLATION/GATE VALVE:

A. Valves 3 inches and smaller: 125 lb. WSP bronze gate valve with screw-in bonnet, non-rising stem and solid wedge disc, NIBCO T-113 K, or approved equal. Valves shall be line size.

B. Valves larger than 2": shall have square nut stem and o-ring connections for key operation.
2.10 BOX FOR QUICK COUPLER & ISOLATION VALVE

A. 10" diameter black plastic, Ametek, Brooks, Christy, Rain Bird with bolt down black lid marked "irrigation," or accepted equal. Avoid locating valve in paved areas. Provide H/20 Loading concrete box with bolt-down concrete lid if valve is located in paved area. Obtain location approval by Owner's Representative.

2.11 DRIP IRRIGATION

A. Drip Manifold:

1. Pressure Regulator: Preset at 30 psi outlet pressure, ¾" female threaded inlet and outlet, by RainBird, Torro or equal.

2. Emitters: Xeri-Bug (XB Series) by RainBird, Toro EZ Drip Series, or equal.

3. Flexible PVC: ASTM D2287 algae-resistant flexible PVC as recommended by manufacturer of Drip Emitters.

4. Drip tubing: Conform to A. S. A. E. standards for minimum inside diameter and wall thickness, Minimum 2% carbon black, Salco ¾” AR Drip PVC flexible drip hose, or equal.

5. ¾” Y-filter, 200 mesh.

6. Toro DL 2000 Air/Vacuum Relief Valves and In-line Spring Check Valves.

7. ¾” manual PVC ball valve with extra 3’ of hose coiled in valve box.

8. Drip system in accordance with “RainBird Xerigation Low-Volume Landscape Irrigation Design Manual” and as shown on the drawings as required for a complete working system.

2.12 SUBSURFACE DRIP IRRIGATION

A. As specified herein and as shown on the drawings and in accordance with manufacturer’s recommendations. Provide all miscellaneous valves, filters fittings etc. required for a complete, operable system including the following:

1. Emitters shall be Rain Bird XF-SDI with “Copper Shield” technology. Drip system in accordance with “RainBird Xerigation Low-Volume Landscape Irrigation Design Manual” and as shown on the drawings as required for a complete working system.

B. Drip Valve Assembly: Size valve box large enough and deep enough to contain assembly and allow convenient access and easy removal of filter screen. Position filter pointed down, approximately 45 degrees.

C. Pressure regulator: Size regulator in accordance with flow rate. Do not over size. Use factory pre-set regulator at 30 PSI.

2.13 SWING JOINTS

A. Quick Coupling Valve: Dura 1-inch 1-A2-1-11-18 pre-assembled swing joint with O-rings and Dura quick lock to receive stabilizing rod.

2.14 CONDUIT/SLEEVES

A. Sleevng shall be Schedule 40 PVC pipe sleeves and a minimum of two times the aggregate diameter of all pipes contained within the sleeve. Provide vertical sweep for all electrical conduit on each side of hardscape and terminate ends at 12” minimum depth and 12” from hardscape surface.

2.15 Y-STRAINER

A. “Y”-Strainer upstream of remote control valves, Brass, 100 mesh.

2.16 RCV IDENTIFICATION TAGS

A. Plastic or brass tags with valve number, approximately 2” by 2” with number imprinted, as accepted by Owner.

2.17 MISCELLANEOUS INSTALLATION MATERIALS

A. Solvent Cement and Primers for Solvent-weld Joints: Make and type approved by manufacturer(s) of pipe and fittings. Maintain cement proper consistency throughout use.

B. Pipe and Joint Compound: Permatex: Do not use on sprinkler inlet port.

2.18 MISCELLANEOUS EQUIPMENT/ACCESSORIES

A. Concrete for equipment pads: Poured-in-place Class A concrete per Section 90 of the Caltrans Standard Specifications.

B. Sleeves and Conduits: See Drawings.

C. Key(s) for Quick-Coupling Valves:

1. Type: Same manufacturer as Quick-Coupling Valve.

2.26 OTHER EQUIPMENT: As shown on Drawings and required for a fully functional irrigation system.
PART 3 - EXECUTION

3.01 EXAMINATION

A. Sleeves and Conduits: Verify that all installed sleeving and conduits are undisturbed and are free of defects or errors introduced by the work of other sections.

B. Water Meter/Water Pressure: Test and verify that existing water pressure is the minimum pressure at maximum system g.p.m. to operate the irrigation system as indicated on the drawings.

C. Stub-outs: Verify that all stub-outs to be provided under another contract are correctly sized, located and installed as noted on Drawings.

D. Notification: Submit written notification to Owner's Representative within ten (10) working days of above inspections describing all acceptable and non-acceptable site conditions.

3.02 CONNECTIONS TO SERVICES

A. Provide and coordinate connection to water meter.

B. Provide and coordinate connection of irrigation controller to electrical power source.

3.03 EXCAVATING & TRENCHING

A. Prior to trenching, layout main and lateral line locations within Drip Line of trees and review locations with Owner's Representative. Relocate any lines that may interfere with existing root systems to avoid or reduce damage to root systems as accepted by Owner's Representative.

B. Refer to 1.03 QUALITY ASSURANCE above and Section 02100 TREE PROTECTION for more information.

C. Dig trenches wide enough to allow a minimum of three inches (3") between parallel pipe lines. Provide a minimum cover from finish grade as shown in drawings.

3.04 INSTALLATION

A. Install irrigation system components in accordance with this Section, with the Drawings, with the manufacturer’s recommendations, and with established industry standards. The Contractor shall do nothing that may jeopardize any manufacturer warranty.

B. Conduits and Sleeves:
   1. Coordination: Provide conduits and sleeves and coordinate installation with other trades.
   2. Extent: Install conduits and sleeves where control wires and pipes pass under paving or through walls as shown on Drawings. Extend twelve inches (12") beyond edges of paving and walls and cap ends until ready for use.
C. Pipeline Assembly:

D. Install pipe and fittings in accordance with manufacturer's current printed Specifications.

E. Clean all pipes and fittings of dirt, scale and moisture before assembly.

F. Solvent-welded Joints for PVC Pipes:
   2. Curing Period: Minimum of one (1) hour before applying any external stress on the piping and at least 24 hours before placing the joint under water pressure.

G. Threaded Joints for Plastic Pipes:
   1. Use Permatex on all threaded PVC fittings except sprinkler heads and quick coupler valve ACME threads.
   2. Joining: Use strap-type friction wrench only. Do not use metal-jawed wrench. Assemble finger tight plus one or two turns.

H. Laying of Pipe:
   1. Bedding On-grade: Remove from trench all rocks or clods. Bed pipe in at least 2 inches of soil excavated from trench. Backfill on all sides of piping to provide a uniform bearing.
   2. Snaking: Snake pipe from side to side of trench bottom to allow for expansion and contraction. Minimum allowance for snaking is one (1) additional foot per 100 ft. of pipe.
   3. Moisture Restrictions: Do not lay PVC pipe when there is water in the trench. Do not assemble PVC pipe unless the pipe is dry.

I. Control Valves:
   1. Install in valve boxes where shown on Drawings and group together where practical. Install box flush with finish grade, not necessarily level. If valve occurs in drainage swale, relocate out of drainage swale as approved by Owner's Representative.
   2. Where two or more valves are installed adjacent to each other, provide at least six inches (6") separation. Align boxes in a row, perpendicular with pavement edge.
   3. Permanently mark valve box lid with 2" black valve number and controller letter or with numbered metal tag inside box as approved by Owner's Representative.

J. Install “Y”-Strainer upstream of remote control valves at backflow preventer with two pressure gauges, one upstream and one downstream of each strainer/filter.

K. Irrigation Head Installation
1. Pop-up Spray Heads:
   a. Place all spray heads in planting areas with top of heads set to finish grade or top of mulch as required.
   b. Place part-circle pop-up sprinkler heads two inches (2") from edge of and flush with top of adjacent walks, header boards, curbs and mowing bands or paved areas and 12 inches (12") from building foundations at time of installation.

2. Drip Irrigation:
   a. Install system in accordance with "RainBird Landscape Irrigation Design and Specifications Xeriigation Products and Details" or equal and as shown on the Drawings as required for a complete working system.
   b. Install Toro DL 2000 Air/Vacuum Relief Valves at high points in system.
   c. Install manual PVC ball valve with extra 3’ of hose coiled in valve box at end(s) of collector laterals so that entire system will flush and be free of dirt and debris.

L. Automatic Controller:
   1. General: Install with lock box cutoff switch per local code and manufacturer's current printed specifications. Provide each controller with its own independent low voltage common ground wire.
   2. Connection to Valves: Connect remote control valves to controller in clockwise sequence to correspond with station setting beginning with Stations 1, 2, 3, etc.
   3. Labeling: Affix controller letter (i.e., "A") on inside of controller cabinet door with minimum of one-inch (1") high permanent letter.
   4. Irrigation Diagram: Affix a non-fading, waterproof copy of irrigation diagram to cabinet door below controller name. Irrigation diagram to be sealed between two plastic sheets, 20 mil. minimum thickness. Use a legible reduced copy of the Record Drawing for the irrigation diagram clearly showing all valves operated by the controller, station, number, valve size, and type of planting irrigated. Color code area operated by each valve.

M. Control Wiring:
   1. General: Install control wires in common trenches with sprinkler mains and laterals wherever possible. Lay to the bottom side of pipe line. Provide looped slack at valves. Snake wires in trench to allow for contraction of wires. Tie wires in bundles at 10 ft. intervals.
2. Extra Length: Provide 30 inches (30") extra control wire at each remote control valve splice to facilitate the removal of the remote control bonnet to finish grade without cutting wires.

3. Size: Minimum size of wire is to be determined strictly by the manufacturer's current printed specifications for remote control valves, but not smaller than #14.

4. Splicing: Crimp control wire splices at remote control valves. Seal with specified splicing materials. In-line splices will be allowed only on runs exceeding 2500 feet and only in junction boxes.

N. Closing of Pipe and Flushing of Lines:
   1. Capping: Cap or plug all openings as soon as lines have been installed to prevent entrance of materials that would obstruct the pipe. Leave in place until removal is necessary for completion of installation.

O. Rain Shutoff Switch:
   1. Install switch in area not affected by irrigation or rain shadow. Provide wires in rigid conduit as accepted by Owner's Representative.

P. Detection Wire and Warning Tape:
   1. Install a bare #12 copper wire or greater on top of the PVC supply line for the purpose of possible future mine detection search.
   2. Install a continuous PVC irrigation mainline warning tape 12" above the supply line.

Q. RCV Identification Tags:
   1. Install in remote control valve box as recommended by manufacturer and as accepted by Owner's Representative.

R. Miscellaneous Equipment
   1. Install miscellaneous equipment with concrete footings, brackets, etc., as required and as recommended by manufacturer.

3.05 FIELD QUALITY CONTROL

A. Testing of Irrigation System:
   1. Make hydrostatic tests with risers capped when welded PVC joints have cured at least 24 hours. Center load piping with backfill to prevent pipe from moving under pressure. Keep all couplings and fittings exposed.
   2. Install two (2) pressure gauges at opposite ends of main line system. Pump system up to a minimum of 125 psi the day preceding the scheduled test and verify that pressure is holding. Inspect system early following day and immediately notify Owner's Representative if the test confirmation must be postponed.
3. Apply continuous static water pressure of 125 psi in accordance with Caltrans Standard Specifications Section 20-5.03H, except after a drop in pressure (5 psi maximum), then the pressure must stabilize and remain stable for a one (1) hour minimum period before acceptance of the test.

4. Leaks detected during tests shall be repaired and test repeated until system passes tests at no additional cost to Owner.

B. Irrigation Audit Report with Certificate of Completion:

1. Per the requirements of the California Model Water Efficient Landscape Ordinance, the Contractor shall perform an irrigation audit and provide a report with certificate of completion to the local agency that may include, but is not limited to: inspection, system tune-up, system test with distribution uniformity, reporting overspray or run off that causes overland flow, and preparation of an irrigation schedule. Irrigation audits shall be conducted by a CLIA Certified landscape Irrigation Auditor by the Irrigation Association. Operation of the irrigation system outside the normal watering window is allowed for auditing and system maintenance.

C. Adjustment of the System:

1. Flush and adjust all spray heads for optimum performance and to prevent overspray onto walks, roadways and buildings. Adjust the arc and radius as applicable.

2. Include as a part of the work any nozzle changes or arc adjustments necessary due to daytime windy conditions during grass establishment period. After plants have been established and watering can be performed during calm early morning or evening hours, make any required adjustments to nozzles and arcs.

3. Set all irrigation heads perpendicular to finished grades unless otherwise noted on the drawings.

4. When the irrigation system is completed and before planting, perform a coverage test in the presence of the Owner's Representative to determine if the water coverage for planting areas is adequate.

5. Test controllers individually in the presence of the Owner’s Representative and the Landscape Architect. Demonstrate that all control valves operate electronically. Provide vehicles and radio equipment as necessary to expedite this process.

6. Demonstrate to Owner's Representative that irrigation scheduling programmed into controller is adequate for plant requirements without causing runoff, and that scheduling capacities of controller are utilized.
3.06 IRRIGATION SCHEDULING AND CONTROLLER PROGRAMMING

A. Per the requirements of the California Model Water Efficient Landscape Ordinance All irrigation schedules and programs shall be developed, managed and evaluated to utilize the minimum amount of water required to maintain plant health.

B. Irrigation controller Scheduling and Programming Parameters to be conducted by a CLCA Certified Irrigation manager and submitted to the local agency as part of the Certificate of Completion.

C. Parameters used to set the automatic controller shall be developed for each of the following:
   1. Plant establishment period
   2. Established landscape period
   3. Temporary irrigated area (if applicable)

D. Each irrigation schedule shall consider for each station all of the following that apply:
   1. Irrigation interval (days between irrigation)
   2. Irrigation run times (hours or minutes per irrigation event to avoid runoff)
   3. Number of cycle starts required for each irrigation event to avoid runoff
   4. Amount of applied water scheduled to be applied on a monthly basis
   5. Application rate setting
   6. Root depth setting
   7. Plant type setting
   8. Soil type
   9. Slope factor setting
   10. Shade factor setting
   11. Irrigation uniformity or efficiency setting

E. Total annual applied water shall be less than or equal to Maximum Applied Water Allowance (MAWA). Actual irrigation schedules shall be regulated by automatic irrigation controllers using current reference evapotranspiration data (CIMIS or soil moisture sensor data).
F. BACKFILL AND COMPACTING

1. General: After system is operating and required tests and reviews have been made, backfill excavations and trenches with clean soil, free of debris.

2. Backfill for All Trenches: Regardless of the type of pipe covered, compact to minimum 95% density under pavements and 85% under planted areas.

3. Finishing: Dress off areas to finish grades. Re-dress any areas which subsequently settle.

4. Owner's testing agency will test backfill compaction in areas under paving.

G. MAINTENANCE

1. The entire sprinkler irrigation system shall be under full automatic operation for a period of 2 days prior to any planting.

2. The Owner's Representative reserves the right to waive or shorten the operation period.

3. Maintain/repair system for full duration of plant maintenance period.

4. Pursuant to the requirements of the California Model Water Efficient Landscape Ordinance, the Owner is to provide a regular maintenance schedule with certificate of completion to the local water agency including, but not limited to: routine inspection, adjustment and repair of the system and its components, aerating and dethatching turf areas, replenishing mulch, fertilizing, pruning, weeding, removing and obstruction to emission devices. Operation of the irrigation system outside the normal watering window is allowed for auditing and system maintenance. Systems to be maintained to meet or exceed an average landscape irrigation efficiency of 0.71.

H. REVIEWS PRIOR TO ACCEPTANCE

1. Notify the Owner's Representative in advance for the following reviews, according to the time indicated:

   a. Supply line pressure test and control wire installation - 72 hours.

   b. Coverage and controller test - 72 hours.

   c. Final review - 7 days.

2. No reviews will commence without record drawings, without completing previously noted corrections, or without preparing the system for review.
3.07. FINAL CLEANING, per section 017423 and FINAL CLOSEOUT REVIEW, per section 017716.

A. Operate each system in its entirety for the Owner's Representative at time of final review. Any items deemed not acceptable by the Owner's Representative shall be reworked to the complete satisfaction of the Owner's Representative.

B. Provide evidence to the Owner's Representative that the Owner has received all accessories and equipment as required before final review can occur.

C. Final acceptance and start of warranty period will occur no earlier than the end of the plant maintenance period.

D. For time of final review, Contractor shall arrange a meeting with the Owner's maintenance personnel to demonstrate the operation of the irrigation systems automatically in order to verify acceptance and to familiarize the maintenance personnel with the system and recommended programming.

END OF SECTION
SECTION 02832

AUTOMATIC GATE OPERATORS

PART 1 - GENERAL

1.01 WORK INCLUDED

A. The work includes, but is not limited to, gates, posts and rollers, sliding gate operators, controls, safety loops in paving, and key boxes for official access keys as shown on drawings and as specified herein.

B. Related Work Specified elsewhere: Poured in place concrete, Electrical power supply, Electrical conduits for power and low voltage controls, Finish hardware.

1.02 SUBMITTALS

A. Submit shop drawings showing each of the items to be provided under this section. Shop drawings shall indicate installation and assembly conditions, wiring diagrams, components, anchorage, materials, and finishes. Coordinate wiring diagram with electrical drawings.

1. Submit separate drawings for each unique site condition. Drawings shall clearly delineate all required components of the operator system.

B. Submit manufacturer’s instructions for installation.

C. Submit manufacturer’s data for each of the specified products.

D. Submit certificates from manufacturer stating that automatic gate operators conform to the specified requirements.

E. Submit manufacturer’s parts list and maintenance instructions for each type of operator.

1.03 PRODUCT DELIVERY, STORAGE AND HANDLING

A. Materials shall be delivered to the site in undamaged condition, stored in fully covered, well ventilated areas, and protected from moisture as recommended by the manufacturer.

1.04 WARRANTY

A. Provide a full five year manufacturer’s warranty on all components of gate operator system.

B. Provide a one year maintenance agreement to inspect, maintain, repair and replace all gate operator parts.

PART 2 - PRODUCTS

201. GATES

A. Gates: Gates shall constructed from the structural shapes and sizes indicated on the drawings. All welds shall be continuous, tack welding will not be permitted. Grind all welds smooth.
1. Electrically Controlled Gate: Provide rolling gates to the sizes and shapes indicated and as specified in Section 05500, "Metal Fabrications". Provide rolling gate with an opener, a controlled electrical motor assembly, with motor size and reduction ratio as required for the size and weight of the gate. Provide a key pad and card access controller to activate openers. Gate opener assembly shall carry UL certification. All components of the gate opening assembly shall be from the same manufacturer.

2.02 AUTOMATIC GATE OPERATORS

A. High Traffic Commercial Rolling Gate Operator, Elite SL3000, by Liftmaster, Larko, or equal.

2.03 OPERATOR UNIT

A. Provide for manual operation in event of power failure.
B. Power requirements: 120 volt, 60 hertz, single phase power (20 amp).
C. Gate operator: motor shall be 1/2 HP minimum. Housing shall be 11 gauge, painted galvanized steel.
D. Operators shall have:
   1. 1/2 HP capacitor run motor.
   2. Planetary gear reducer.
   3. Adjustable torque limiter.
   4. Lockable quick disconnect arm for manual gate operation in case of power failure.
   5. 2-1/2 inch diameter output shaft.
E. Gate speed shall be a minimum of 70 feet per minute.
F. Safety and Exit Loops: Wire loops in paving for safety to prevent gate closing on autos in opening and exit loop.

2.04 CARD READER CONTROL UNIT

A. Keypad Gate Controller: Control unit shall be push button key pad programmable with multiple four digit codes, "Ak-11" by Linear Access Systems, Inc., or equal. Key pad shall have an audible tone when pad is depressed. Provide with LED indicators. Provide with Knox key switch. Unit shall be post mounted with dual mounting heights.
B. Provide with Knox key switch.

2.05 MISCELLANEOUS EQUIPMENT:

A. Emergency Strobe: FireStrobe 2000, or equal, rapid access gate opener. Provide power as required to operate unit.
C. Knox box for keys for Fire Department.
D. Automatic Reversing Control Photo Eye: Provide electric eye sensing system that will stop the gate if there are any obstructions in the way of the door travel.
E. Exit and Safety Loops: Provide buried exit and safety loops with vehicle detector on each side of gate.

2.06 SEQUENCE OF OPERATION

A. Parking Area: Provide all accessories required for the sequence of operation as follows:

To Enter:
1. Activate keypad access control system located on post assembly to open gate.
   Gate shall close automatically after vehicle has cleared safety loop detector on the inside of the gate.

2. Activate gate operator by operation strobe mounted on Fire Apparatus to open gate.
   Gate shall close automatically after apparatus has cleared safety loop detector on the inside of the gate.

3. Activate gate operator by remote control operator to open gate.
   Gate shall close automatically after vehicle has cleared safety loop detector on the inside of the gate.

To Exit:
1. Gate shall open automatically after vehicle has entered the detection exit loop on the inside of the gate and shall close again automatically after vehicle has cleared the exterior safety detection loop.

2.07 CONCRETE

A. ASTM C94, 3/4 inch aggregate, minimum compressive strength of 2,500 PSI at 28 days.

PART 3 - EXECUTION

3.01 CONSTRUCTION

A. Inspect adjacent and related work in the vicinity.

B. Starting work of this section means acceptance of site conditions.

3.02 INSTALLATION

A. Install automatic gate operator and accessories in accordance with shop drawings and manufacturer's instructions. Connect low voltage control wiring. Provide all power required for operation of gate and accessories.

B. Coordinate installation of components with other contractors and adjacent work.

1. Safety loops shall be installed before concrete is poured. Sawcutting for safety loops will not be permitted.

C. Adjust automatic gate equipment for correct function and smooth operation.

D. Provide concrete level pads of size per manufacturer's recommendations, 2 inches above highest adjacent grade or curb and minimum 18 inches into compacted soil.
3.03 WRENCHES AND TOOLS

A. Provide wrenches and tools required for maintenance of equipment.

END OF SECTION
SECTION 02900
PLANTING

PART 1 - GENERAL

1.01 DESCRIPTION

A. Provide planting work and planting maintenance complete as shown on the drawings and as specified including staking and layout of the landscaping and soil sampling as required by the State of California Model Water Ordinance.

B. Related work specified elsewhere includes:
   1. Section 02110, PLANT PROTECTION
   2. Section 02300, EARTHWORK
   3. Section 02810, IRRIGATION

1.02 QUALITY ASSURANCE

A. Reference Standards:
   1. Ordinances and Regulations: All local, municipal and state laws, codes and regulations governing or relating to all portions of this work are hereby incorporated into and made a part of these Specifications. Anything contained in these Specifications shall not be construed to conflict with any of the above codes, regulations or requirements of the same. However, when these Specifications and Drawings call for or describe materials, workmanship or construction of a better quality, higher standard than is required by the above mentioned codes and regulations, the provisions of these Specifications and Drawings shall take precedence. Furnish without extra charge additional materials and labor required to comply with above rules and regulations.
   2. Contractor shall be familiar with and follow the State of California Model Water Ordinance, California Code of Regulations, Title 23 Waters, Division 2, Department of Water Resources, Chapter 2.7. Also, the Contractor is responsible to follow all local water ordinances and the Soil Management/Analysis Report with verifying implementation.
6. **Manufacturer's recommendations.**

**B. Qualifications:**

1. **Experience:** Assign a full-time employee to the job as foreman for the duration of the Contract who is certified landscape technician, certification through CLCA or minimum of four (4) years of experience in landscape installation and maintenance supervision, with experience or training in turf management, entomology, pest control, soils, fertilizers and plant identification.

2. **Labor Force:** Provide a landscape installation and maintenance force thoroughly familiar with, and trained in, the work to be accomplished to perform the task in a competent, efficient manner acceptable to the Owner.

**C. Requirements:**

1. **Supervision:** The foreman shall directly supervise the work force at all times and be present during the entire installation. Notify Owner's Representative of all changes in supervision.

2. **Identification:** Provide proper identification at all times for landscape maintenance firm's vehicles and a labor force uniformly dressed in a manner satisfactory to Owner's Representative.

3. **Planting soils and organic amendments** shall meet the AACWP requirement for the stormwater treatment measures used with this project work.

**D. Plant Material Standards:**

1. **Quality and Size of Plants shall conform to the State of California Grading Code of Nursery Stock, No. 1 grade and American Standards for Nursery Stock,” American Association of Nurseryman. Use only nursery-grown stock which is free from insect pests and diseases.**

2. **Comply with federal and state laws requiring inspection for plant diseases and infestations. Submit inspection certificates required by law with each shipment of plants, and deliver certificates to the Owner. Obtain clearance from the County Agricultural Commissioner as required by law, before planting plants delivered from outside the County in which planted.**

**E. Soil and Soil Amendment Testing and Analysis:**

1. **Soils Testing Agency:** Soil and Plant Laboratory, Inc., 1101 Winchester Blvd., Suite G-173, San Jose, CA 95128, Tel. (408) 727-0330; or Root Zone Associates, P.O. Box 18911, San Jose, CA 95118; Tel. (408) 264-7024, or approved equal.

2. All soils and organic soil amendments shall be submitted and tested by an accredited soils analyst. A standard soil analysis report shall identify sample source and include chemical analysis, fertility, agricultural suitability, and infiltration rates for soils. The report shall include all major nutrients, pH, salinity, boron, sodium, micronutrients, copper, zinc, manganese and iron, adsorption rate, organic content, soil texture and particle sizes. The report shall also include...
recommendations for modification of the soil(s) for agricultural suitability and compliance with the specified requirements, ordinances and regulations noted herein. Contractor to provide soil amendment report to be approved by landscape architect.

3. Upon approval of the soils report by the Landscape Architect, the recommendations in the report shall become a part of the Specifications and the quantities of soil amendment, fertilizer and other additives shall be adjusted to conform with the report at no additional cost to the owner. Request Testing Laboratory to send one copy of test results directly to Landscape Architect and one copy to the Owner.

4. Topsoil Laboratory Analysis Report

   a. After approval of rough grading and topsoil placement, obtain minimum of two representative one quart samples of topsoil taken from accepted site locations at depth of 4" to 6" below finish grade and submit to an accredited Soils Laboratory for evaluation of physical and chemical properties of soil including all major nutrients; pH, salinity, boron, sodium, micronutrients, copper, zinc, manganese and iron; and infiltration rate, soil texture and organic content, along with a summary describing the degree of compliance with the specified requirements.

   b. The existing topsoil analysis report will be used to identify any required additives that need to be added to the topsoil as well as identify if imported soils are compatible for use with the existing topsoil.

   c. Submit documentation verifying implementation of soil analysis report recommendations.

   d. The Contractor is responsible to follow all local water ordinances and make available to the local agency the soil analysis report and verification of its implementation as required.

F. Coordinate plant locations with irrigation emitter locations.

   1. Adjust plant locations in relation to the subsurface emitter as required to ensure that the plant roots receive the proper amount of water in order for it to thrive.

   2. Coordinate planting and irrigation and provide hand watering of emitter irrigated and drip irrigated areas as required to maintain moist root zones throughout plant establishment period.

G. Damage from Deer, Rodents, Insects and Disease

   1. Investigate planting for signs of damage from Deer, Rodents, Insects and Disease and provide repellents, barriers, or treatment and/or replacement upon discovery. Replace all damaged plants as described below in PLANTING ESTABLISHMENT MAINTENANCE.
1.03 SUBMITTALS, per Section 01300

A. Submit to the Landscape Architect, Manufacturer's current catalog cuts and technical data sheets of the following:
   1. Fertilizers
   2. Iron Sulfate
   3. Tree and plant Ties/Support/Guying Materials
   4. Pre-emergence Weed Killer

B. Plant Samples:
   1. Submit typical sample of each plant variety, or entire plant quantity to site for approval by Landscape Architect.

C. Organic Soil Amendment:
   1. Submit 1-pint sample with certificate of compliance / analytical data Sheet.
   2. Provide delivery receipts for quantities of organic soil amendments delivered to the site.

D. Mulch Samples:
   1. Organic Mulch: Submit 1-pint sample with source and list of ingredients.

E. Planting Soil(s): Submit 1-pint sample along with Laboratory certificates of compliance / analytical data sheet and recommendations, including but not limited to the required samples listed below. The sample submitted for testing shall be from the supplier’s current soil source and dated less than 6 months prior to installation. State the name and location of the supply source. Upon approval of the Laboratory’s recommendations by the Landscape Architect, the recommendations in the report shall become a part of the Specifications:
   1. Plant Backfill (Topsoil)
   2. Stormwater Treatment Backfill

F. Topsoil Laboratory Analysis Report
   1. Submit Topsoil Laboratory Analysis report as described above in PART 1. Quality Assurance.
   2. Upon approval of the Laboratory’s reports by the Landscape Architect, the recommendations in the report shall become a part of the Specifications and the quantities of soil amendment, fertilizer and other additives shall be adjusted to conform with the report at no additional cost to the owner. Request Testing Laboratory to send one copy of test results directly to Landscape Architect and one copy to the Owner.
G. Subsoil Laboratory Analysis Report
   1. Besides the above required soil samples, take one representative sample of any soil/subsoil that is to receive a layer of imported planting soil over it. The laboratory report shall include the soil/subsoil’s total combined silt and clay content for determining the total desirable combined silt and clay content of the final imported planting soil cover specified herein.

1.04 PROJECT/SITE CONDITIONS
   A. Site Visit: At beginning of work, visit and walk the site with the Owner's Representative to clarify scope of work and understand existing project/site conditions.
   B. Protection of Plants from Deer: Contractor shall be responsible for protection of all planting from deer as described in Part 3- Execution.

1.05 WARRANTY AND REPLACEMENT, per Section 017836.
   A. Pre-Emergence Weed Killer: Warrant the work against weed growth for a period of four (4) months after application.
   B. Warrant all plants and planting to be in a healthy, thriving condition until the end of the maintenance period, and deciduous trees, shrubs and vines beyond that time until active growth is evident.
   C. Replace all dead and damaged plants and plants not in a vigorous condition immediately upon discovery and as directed by the Owner's Representative at Contractor's expense. Install replacement plants before the final acceptance at the size specified.
   D. Warrant all plant material for a period of one year after final acceptance of the maintenance period against plant materials with defects at the time of installation.
   E. Warrant plant installation and maintenance by Contractor against defects for a period of one year.

PART 2 - PRODUCTS

2.01 PLANTS
   A. Plant the variety, quantity and size indicated. The total quantity tabulated on the drawings are considered approximate and furnished for convenience only. Contractor shall perform his/her own plant quantity calculations and shall provide all plants shown on the Drawings. If plants are shown on the Drawings but are not identified, Contractor shall provide plants of similar size and variety to nearby identified plants at no additional cost to the Owner.
   B. Measure trees and shrubs with branches in normal position. Height and spread dimensions indicated refer to the main body of the plant, and not from branch tip to tip.
   C. Tag plants of the type or name indicated and in accordance with the standard practice recommended by the American Association of Nurserymen.
D. Install healthy, shapely and well rooted plants with no evidence of having been root-bound, restricted or deformed.

E. Ensure that the plants arrive at the site in proper condition for successful growth. Protect plants in transit from windburn and sunburn. Protect and maintain plants on site by proper storage and watering.

F. Substitutions will not be permitted, except as follows:
   1. If proof is submitted to the Landscape Architect that any plant specified is not obtainable, a proposal will be considered for use of nearest equivalent size or variety with an equitable adjustment of contract price.
   2. Substantiate and submit proof of plant availability in writing to the Landscape Architect within 10 days after the effective date of Notice to Proceed.

G. Tree Form: Trees shall have a symmetrical form as typical for the species/cultivar and growth form.
   1. Central Leader for Single Trunk Trees: Trees shall have a single, relatively straight central leader and tapered trunk, free of co dominant stems and vigorous, upright branches that compete with the central leader. Preferably, the central leader should not have been headed; however, in cases where the original leader has been removed, an upright branch at least ½ the diameter of the original leader just below the pruning point shall be present.
   2. Potential Main Branches: Branches shall be evenly distributed radially around and appropriately spaced vertically along the trunk, forming a generally symmetrical crown typical for the species.
   3. Headed temporary branches should be distributed around and along the trunk as noted above and shall be no greater than 3/8” diameter, and no greater than ½ diameter of the trunk at point of attachment.

H. Tree Trunk
   1. Trunk diameter and taper shall be sufficient so that the tree will remain vertical without the support of a nursery stake.
   2. Trunk shall be free of wounds (except properly-made pruning cuts), sunburned areas, conks (fungal fruiting-bodies), wood cracks, bleeding areas, signs of boring insects, galls, cankers and/or lesions.
   3. Tree trunk diameter at 6” above the soil surface shall be within the diameter range shown for each container size below, except where shown otherwise:
<table>
<thead>
<tr>
<th>Container</th>
<th>Trunk Diameter in inches</th>
<th>Soil level from Container Top</th>
</tr>
</thead>
<tbody>
<tr>
<td>5 gallon</td>
<td>0.5” to 0.75”</td>
<td>1.25 to 2”</td>
</tr>
<tr>
<td>15 gallon</td>
<td>0.75” to 1.0”</td>
<td>1.75 to 2.75”</td>
</tr>
<tr>
<td>24” Box</td>
<td>1.5” to 2.5”</td>
<td>2.25 to 3”</td>
</tr>
</tbody>
</table>

4. Tree trunks shall be undamaged and uncut with all old abrasions and cuts completely callused over. Do not prune plants prior to delivery.

I. Tree Roots

1. Trunk root collar (root crown) and large roots shall be free of circling and/or kinked roots. Contractor may be required to remove soil near the root collar in order to verify that circling and/or kinked roots are not present.

2. The tree shall be well rooted in the container. When the trunk is lifted the trunk and root system shall move as one and the rootball shall remain intact.

3. The top-most roots or root collar shall be within 1” above or below the soil surface. The soil level in the container shall be within the limits shown in above table.

4. The rootball periphery shall be free of large circling and bottom-matted roots.

5. On grafted or budded trees, there shall be no suckers from the root stock.

J. Shrubs

1. Each shrub must stand upright without support.

2. All container shrubs shall be free of girdling roots, defined as those roots greater than 1/8” diameter circling the periphery of the rootball. The top of the rootball shall be free of "Knees" (roots) protruding above the soil, and the bottom shall be free of matted roots.

2.02 PLANT BACKFILL

A. Except for acid loving plants (Azaleas, Rhododendrons, Ferns, Camellias, etc.), use a mixture of 2 parts soil from the hole, and 1 part amendment with iron added at the following rates:

<table>
<thead>
<tr>
<th>Size</th>
<th>Rate</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 gallon can plants</td>
<td>iron, 1/4 cup</td>
</tr>
<tr>
<td>5 gallon can plants</td>
<td>iron, 1/3 cup</td>
</tr>
<tr>
<td>15 gallon can plants</td>
<td>iron, 1/2 cup</td>
</tr>
<tr>
<td>24” box and larger</td>
<td>iron, 1 cup</td>
</tr>
</tbody>
</table>

B. Mix the iron, amendment and soil thoroughly for use only in the top 8 inches of backfill around plants. For acid loving plants, mixture to be 1/2 soil from the hole and 1/2 amendment only in the top 8 inches.
2.03 EXISTING PLANTING SOIL (TOPSOIL)

A. Existing Planting Soil (TOPSOIL) is defined as on-site surface soil. Satisfactory planting soil shall be free of subsoil, clay, lumps, stones, and other objects over 4” in diameter, and without weeds, roots, and other objectionable material.

B. Strip planting soil to whatever depths encountered, a maximum of 12 inches in a manner to prevent intermingling with the underlying subsoil or other objectionable material. Topsoil stripping is limited to area outside “Drip Line” of existing trees to remain and areas indicated on drawings and as approved by the Owner's Representative.

C. Remove heavy growths of grass from areas before stripping.

D. Stockpile topsoil in storage piles in areas shown, or where designated by Owner. Do not mix topsoil with subsurface soils. Construct storage piles to freely drain surface water. Cover storage piles if required to prevent windblown dust.

E. If herbicide contamination is suspected then a radish/ryegrass growth trial must be performed. Consult with Landscape Architect prior to decision to test or not.

F. Conduct Topsoil Laboratory Analysis as described in PART 1. Quality Assurance.

2.04 SUBSOIL SAMPLING

A. Conduct Subsoil Laboratory Analysis as described in PART 1. Quality Assurance. Submit analysis report for approval by the Landscape Architect as noted in PART 1, Submittals.

2.05 IMPORTED STORMWATER TREATMENT BACKFILL

A. Planting soil material for surface dewatering shall consist of soil (no Gravel) with a moderate percolation rate (2 to 10 inches per hour) supplied from previously tested and approved sources, and shall conform to the following guidelines:

1. All material shall be free of trash and debris, expansive clays or any other deleterious materials and shall be subject to the approval and acceptance of the Authority Having Jurisdiction.

2. Designate proposed import source in advance and provide source samples of material to the jurisdiction having authority.

3. Material shall be free of seeds.

4. The dewatering planting soil material shall have documentation from supplier showing conformance to the following gradation guidelines:
   a. Maximum Particle Size 2mm (0.078 inch)
   b. % passing No. 10 screen (2mm) 100 (coarse sand or finer)
   c. % passing No. 200 screen (0.074mm) 15 to 50 %
d. The 15 to 50% passing #200 sieve is silt, clay and organics, with a range of silt from 5-35% and a clay content of 4-20%.

5. The above screened dewatering planting soil shall have 4 to 6% by dry weight approved organic compost mixed in. Final dry weight per unit volume mixed in may be lowered by the jurisdiction having authority for varying plant species in the treatment measure/area(s). Native in-situ Sandy Loam soils can be used, with 4 to 6% by weight of organic compost mixed in, if approved by the jurisdiction having authority. This native soil used must be certified to meet the imported planting soil guidelines. Organic compost shall meet the Organic Compost Amendment guidelines stated herein.

6. Contractor shall demonstrate the in-situ percolation of each treatment measure/area for design storm flows through the installed soil to the satisfaction of the Authority Having Jurisdiction. The material shall have an onsite tested percolation rate of 2 to 10 inches per hour. Contractor shall provide records of percolation test to City Inspector.

7. Standard compaction of a minimum of 85% relative compaction shall be used when placing the mixed material. Complete inundation of the soil shall be used to reach this compaction. Place soil in lifts of 8 to 10 inches.

B. Note: Lower percolation rate of dewatering soil may be allowed by the local jurisdiction.

C. Submittal: submit for approval a 1-quart sample of proposed IMPORTED DEWATERING PLANTING SOIL MATERIAL, together with a standard soil analysis report by an accredited soils analyst showing chemical analysis stating source, fertility, agricultural suitability, particle size distribution of the soil and percolation rate. Deliver the sample to the Owner's Representative minimum two weeks before starting the contemplated hauling of the soil.

2.06 ORGANIC AMENDMENT: For use with in situ soils (on-grade)

A. Ground Redwood or Ground Fir Bark with the following properties:

<table>
<thead>
<tr>
<th>Percent Passing</th>
<th>Sieve Designation</th>
</tr>
</thead>
<tbody>
<tr>
<td>100</td>
<td>9.51 mm 3/8&quot;</td>
</tr>
<tr>
<td>50-60</td>
<td>6.35 mm 1/4&quot;</td>
</tr>
<tr>
<td>20-40</td>
<td>4.76 mm No. 4</td>
</tr>
<tr>
<td>0-20</td>
<td>2.38 mm No. 8 8 mesh</td>
</tr>
</tbody>
</table>

Redwood Sawdust
Dry bulk density, lbs. per cu. yd., 260-280
Nitrogen stabilized - dry weight basis, min. 0.4%
Salinity (ECe): 4.0 maximum
Organic Content: 90% minimum
Reaction (pH): 4.0 minimum

Ground Fir and/or Pine Bark
Dry bulk density, lbs. per cu. yd., Min. 350
Nitrogen stabilized - dry weight basis, min. 0.5%
Salinity (ECe): 4.0 maximum
Organic Content: 90% minimum
Reaction (pH): 4.0 minimum

B. **Submittal:** Submit sample along with analytical data from an approved laboratory for degree of compliance to the Landscape Architect within two weeks after award of Contract.

### 2.07 FERTILIZERS

A. Commercial fertilizer, pelleted or granular form, conform to the requirements of Chapter 7, Article 2, of the Agricultural Code of the State of California for fertilizing materials as follows:

1. **Type A:**
   - 6% Nitrogen, 20% Phosphorus Acid and 20% Potash, (6-20-20).

2. **Type B:**
   - 21 gram planting tablets 20% Nitrogen, 10% Phosphoric Acid and 5% Potash (20-10-5) available from Agriform or 10gm BestPacks packets 20% Nitrogen, 10% Phosphoric Acid and 5% Potash (20-10-5) available from Best Fertilizer Co.

3. **Type C:**
   - Complete fertilizer 21% Nitrogen, 7% Phosphoric Acid and 14% Potash (21-7-14).

4. If commercial fertilizer having this analysis is not obtainable, other similar commercial fertilizer may be used providing it meets the approval of the Landscape Architect.

B. Maintenance Fertilizer: Type C

C. **IRON SULFATE:** Agricultural dry form

### 2.08 MULCH

A. Organic Mulch:

1. Redwood Bark; Single grind (Coarse) Coast Redwood Bark (Gorilla Hair). Mulch shall cover the soil, a minimum 3” thick layer.

B. **Submittal:** Submit samples of organic and to the Landscape Architect for approval within two weeks of award of Contract. Resubmit until acceptable to Owner, at no extra cost.

### 2.09 TREE SUPPORT POLES (ON-GRADE PLANTING)

A. For trees up to 36” box size.

B. Peeled lodge pole pine logs, clean, smooth, new, and sized as follows:

1. Two-inch (2") diameter by eight feet (8’) long for trees less than 8’ high and 1” caliper.

2. Three-inch (3") diameter by eight to ten feet (8’ - 10’) long for trees greater than 8’ high and 1-1/2” and larger caliper.
2.10 TREE TIES
   A. Rubber strap, 24-inch minimum length without sharp edges adjacent to trunk, V.I.T. cinch-tie, Dublin, CA, (818)882-9530, or approved equal.

2.11 TREE GUying
   A. For trees larger than 36" box size. Install guying if subgrade does not accept poles sufficiently to stabilize the tree, or unless otherwise noted on Drawings.
   B. 1/8" galvanized steel cable with 21" minimum long rubber tree collar, secured with cable clamp, 3" take-up eye to eye turnbuckle, and attached to anchor for below-grade location, Duckbill Model 68 DTS, or approved equal.

2.12 ROOT BARRIER
   A. UB 18-2 as manufactured by Deep Root Corporation (800)458-7668, Root Solutions, Inc. (800) 554-0914, or equal.

2.13 PRE-EMERGENCE WEED KILLER
   A. Clean non-staining as recommended by a licensed pest control specialist.

PART 3 - EXECUTION

3.01 FINE GRADING AND SOIL PREPARATION
   A. General
      1. Soil in all planting areas shall be moist, but not so moist that it sticks to a hand shovel, and loose and friable to a minimum depth of 12 inches with a relative maximum compaction of 85%. Rip and scarify and dry any areas that do not meet this requirement.
      2. Before proceeding with the work: Carefully inspect all areas and verify all dimensions and quantities. Immediately inform the Landscape Architect of any discrepancy between the drawings and specifications and actual conditions and secure approval to proceed.

3.02 PLANTING SOIL PLACEMENT
   A. Planting Soil Placement - General:
      1. Inspect planting areas and remove all base rock and other foreign material. Verify placement of planting soil within dripline of trees with Owner's Representative. Except within tree driplines, rip all planting areas in two directions full depth of compacted fill (to a minimum of 12 inches) into undisturbed native soil prior to backfilling. Scarification of any planting area which cannot be accomplished with a tractor shall be accomplished by an alternative method approved by the Owner’s Representative to the specified depth to ensure proper percolation/drainage.
      2. Prior to placing planting soil secure the Owner's Representative's acceptance of the planting areas subgrade condition. Test depth of loose soil with hand shovel in
presence of Owner's Representative in several locations as directed. After acceptance of the planting areas subgrade condition, uniformly distribute and spread planting soil backfill over scarified subgrade in planting areas as specified and compact to a maximum of 85% relative compaction.

3. Do not work planting soil in a wet or muddy condition or dump or spread in areas where subgrade is not in proper condition.

4. Water settling, puddling, and jetting of fill and backfill materials as a compaction method is not acceptable.

5. Provide a minimum of 12” depth in planting areas, or more where shown or specified otherwise.

B. Planting Soil Placement - Adjacent to Pavement Areas:

1. Provide planting soil as a final lift in all planting areas within and adjacent to paved areas and other construction where native site soil has been covered by engineered fill and/or base rock. Remove all engineered fill, base rock and compacted subgrade full depth of compaction and replace with approved planting soil, a minimum lift of 12”. Unless shown otherwise, finish grade in planting islands shall be crowned with a minimum 2 % pitch to the edges.

C. All planting areas soil shall be loose and friable prior to planting. Rip any overly compacted and re-compactedit planting areas in two directions full depth of compacting soil prior to planting.

D. Planting operations shall be performed only during periods when beneficial results can be obtained. When excessive moisture or other unsatisfactory conditions prevail, the work shall be stopped until conditions are satisfactory.

E. Thoroughly wet down the planting areas to settle the soil and confirm irrigation coverage and operation. Allow soil to dry so as to be workable as described herein.

F. Drag to a smooth, even surface. Grade to form all swales. Pitch grade with uniform slope to catch basins, streets, curb, etc., to ensure uniform surface drainage. Areas requiring grading include adjacent transition areas that shall be uniformly sloped between finish elevations. Slope surface away from walls so water will not stand against walls or buildings. Control surface water to avoid damage to adjoining properties or to finished work on the site. Take required remedial measures to prevent erosion of freshly graded areas and until such time as permanent drainage and erosion control features have been installed. Refer to Erosion Control Netting below for treatment of slopes 3:1 and steeper.

G. Finish Grade: Hold finish grade and/or mulch surface in planting areas 1/2-inch below adjacent pavement surfaces, tops of curbs, manholes, etc. The subgrade of the mulch in mulched planting areas shall be a minus 2 inches for a distance of 12 to 18 inch from the edge of pavement. The remainder of the planting area shall be graded to receive the required 3 inch layer of mulch.

H. In Situ Soil Preparation:
1. Spread organic amendment, iron and Type A fertilizer evenly over installed and rough graded on-site topsoil in all planting areas including turf, ground cover and shrub areas at the following rates:
   a. Organic Amendment: 6 cubic yards per 1,000 square feet
   b. Fertilizer: Type-A (6-20-20) at 20 lbs. per 1,000 square feet.
   c. Iron Sulfate: 10 lbs. per 1,000 square feet

2. In the case of a contradiction between the quantity of organic amendment required by the Contractor-obtained soils laboratory analysis and the specified quantity shown above, the greater of the two quantities shall take precedence.

3. Rototill above additives into soil 6 to 8 inches deep. Keep iron sulfate off pavement and other surfaces to prevent rust staining. Correct all rust damage to work.

4. Planting soil shall have a pH range of 6.5 to 7.5.

I. After the rototill work, float areas to a smooth, uniform grade as indicated on the drawings. Slope all planting areas to drain. Roll, scarify, rake and level as necessary to obtain true, even planting surfaces. Remove rocks, sticks and debris 1 inch and larger in size in turf areas and 2 inches or larger in shrub and ground cover areas. Secure approval of the grade by the Landscape Architect before any planting.

3.03 STORMWATER TREATMENT BACKFILL PLACEMENT

A. Install the above specified stormwater treatment backfill mix as shown in Drawings after approval of the drainage material installation.

3.04 TREE AND SHRUB PLANTING

A. Mark tree and shrub locations on site using stakes, gypsum or similar approved means and secure location approval by the Landscape Architect before plant holes are dug. Review location of plants in relationship to irrigation heads and adjust location(s) that interfere with the function of the spray heads as accepted by the Landscape Architect prior to planting.

B. Test drainage of plant beds and pits by filling with water (minimum 6"). The retention of water in planting beds and plant pits for more than two (2) hours shall be brought to the attention of the Landscape Architect. If rock, underground construction work, tree roots, poor drainage, or other obstructions are encountered in the excavation of plant pits, alternate locations may be selected by Landscape Architect.

C. Excavate tree and shrub pits as shown in drawings

D. Break and loosen the sides and bottom of the pit to ensure root penetration and water test hole for drainage as required above.

E. Backfill plant holes with mix as specified, free from rocks, clods or lumpy material. Backfill native soil free of soil amendments under rootball and foot tamp to prevent
settlement. Backfill remainder of the hole with soil mix and place plant tablets or packets (Type B fertilizer) 3 inches below finish grade and 1/2-inch from roots at the following rates:

<table>
<thead>
<tr>
<th>Size</th>
<th>Rate</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 gallon can plant</td>
<td>1 tablet or packet</td>
</tr>
<tr>
<td>5 gallon can plant</td>
<td>3 tablets or packet</td>
</tr>
<tr>
<td>15 gallon can plant</td>
<td>6 tablets or packet</td>
</tr>
<tr>
<td>24-inch box plant</td>
<td>6 tablets or packet</td>
</tr>
<tr>
<td>36-inch box plant</td>
<td>8 tablets or packet</td>
</tr>
</tbody>
</table>

F. Carefully remove and set plants without damaging the rootball. Superficially cut edge roots vertically on three sides. Remove bottom of plant boxes before planting. Remove sides of boxes after positioning the plant and partially backfilling.

G. Set plants in backfill with top of the rootball 2 inches above finished grade. Backfill remainder of hole and soak thoroughly by jetting with a hose and pipe section. Water backfill until saturated the full depth of the hole.

H. Build 6" high watering basin berms around trees and shrubs to drain through rootball.

I. Stake and/or guy trees as detailed and noted herein. Drive stake(s) until solid (at least 12" beyond bottom of rootball) and remove excess stake protruding above top tree tie to prevent rubbing against branches. Avoid driving stakes through rootball. If subgrade does not accept stakes to a stable degree, delete stakes and guy the trees as specified herein and as detailed. Locate tree ties to avoid contact with tree branches. Locate top tie at tree flex point.

J. Guy Trees using 3 cables with below grade anchors and rubber collars secured with cable clamps.

K. Remove any soil from top of plant rootballs and secure Landscape Architect's approval of rootball height prior to mulching.

L. After approval of rootball height, install mulch as required below.

3.05 GROUND COVER PLANTING

A. Plant in neat, straight, parallel and staggered rows as indicated on plan. Plant first row one-half required ground cover spacing behind adjacent curbs, structures, or other plant bed limits. Plant ground cover to edge of water basins of adjacent trees and shrubs.

3.06 MULCH

A. Mulch all tree, shrub and ground cover areas with organic mulch to a 3-inch depth, except adjacent to walkways where soil grade is 2 inches below top of pavement, mulch shall be 2 inches deep, and 2-inches deep where planting ground cover plants from flats. Hold bark mulch away from base (trunk) of plant 4" or as directed by the Landscape Architect. Individual trees and/or shrubs planted in non-irrigated areas shall, at minimum, receive bark mulch over their watering basin and berm.
3.07 PRE-EMERGENCE WEED KILLER

A. Apply pre-emergence weed killer in all areas to receive ground cover planting. Work shall be done under the supervision of a person licensed by the State of California as a pest control applicator and holding a qualified applicator license or a Qualified Applicator Certificate. Obtain approval of the finish grades prior to applying weed killer and coordinate planting and watering with the pest control specialist prior to planting. Take care to keep weed killer off areas to be seeded.

3.08 WATERING

A. Water all trees, shrubs and ground cover immediately after planting. Apply water to all plants in sufficient amounts as conditions require to maintain the plants in a healthy vigorous growing condition until completion of the Contract. Do supplemental hand watering of plants as required to maintain optimum moisture in the root zones.

3.09 PRE-MAINTENANCE PERIOD REVIEW AND APPROVAL OF PLANTING

A. Maintain plants from time of delivery to site until final acceptance of landscape installation.

B. Receive approval of the installed planting prior to commencement of planting establishment maintenance period. Notify the Landscape Architect a minimum of seven (7) days prior to requested review. Before the review, complete the following:

1. Complete all construction work.

2. Present all planted areas neat and clean with all weeds removed and all plants installed and appearing healthy.

3. Plumb all tree stakes.

C. No partial approvals will be given.

3.10 PLANTING ESTABLISHMENT MAINTENANCE

A. General Requirements:

1. Maintenance Period: The planting establishment maintenance period required shall be 120 calendar days after all planting is complete, turf is seeded, and installation approved. A longer period may be required if the turf is not thick, vigorous and even and has been mowed a minimum of 4 times, or if the plant material is not acceptably maintained during the maintenance period. The maintenance period may be suspended at any time upon written notice to the Contractor that the landscaping is not being acceptably maintained, and the day count suspended until the landscape is brought up to acceptable standards as determined by the Landscape Architect.

2. Planting establishment maintenance immediately follows, coincides with, and is continuous with the planting operations, and continues through turf installation, and after all planting is complete and accepted; or longer where necessary to establish acceptable stands of thriving plants.
3. Keep all walks and paved areas clean. Keep the site clear of debris resulting from landscape work and maintenance operations.

4. Check sprinkler systems at each watering; adjust coverage and clean and repair non-functioning heads immediately. Adjust timing of sprinkler controller to prevent runoff and flooding.

5. Maintain adequate moisture depth in soil to ensure vigorous growth, without overwatering. Check rootball of trees and shrubs independent of surrounding soils and hand water as required.

6. Keep Contract areas free from weeds by cultivating, hoeing or hand pulling. Use of chemical weed killers will not relieve the Contractor of the responsibility of keeping areas free of weeds over 1-inch high at all times.

3.11 PLANT PROTECTION AND REPLACEMENT

A. Protect all areas against damage, including erosion, trespass, insects, rodents, deer, disease, etc. and provide proper safeguards, including trapping of rodent and applying protective sprays and fencing to discourage deer browsing. Maintain and keep all temporary barriers erected to prevent trespass.

B. Repair all damaged planted areas. Replace plants and reseed or resod turf immediately upon discovery of damage or loss, including damage from Deer and Rodents.

3.12 TREE, SHRUB AND GROUND COVER MAINTENANCE:

A. Maintain during the entire establishment period by regular watering, cultivating, weeding, repair of stakes and ties, and spraying for insect pests. Prune when requested by the Landscape Architect.

B. Keep watering basins in good condition and weed-free at all times.

C. Replace all damaged, unhealthy or dead trees, shrubs, vines and ground covers with new stock immediately; size as indicated on the drawings.

3.13 FERTILIZING:

A. Upon approval and after submitting fertilizer delivery tags, maintenance fertilization shall begin 30 days after planting is complete. Fertilize all turf and ground cover areas by broad-casting Type C (21-7-14) fertilizer at the rate of 5 lbs. per 1,000 square feet evenly throughout. Reapply every forty-five (45) days until acceptable.

B. During the winter, for quick turf greening effect, calcium nitrate (15.5-0-0) may be applied at the rate of 6 lbs. per 1,000 square feet.

C. Early spring and fall substitute a complete fertilizer such as 15-15-15 applied at the rate of 6 lbs. per 1,000 square feet, to help insure continuing adequate phosphorus and potassium.

D. Apply ammonium sulfate fertilizer as necessary to maintain vigorous, green grass between fertilizings mentioned above.
E. Observe plant’s color, and if a soil pH imbalance is suspected, take soil samples and obtain laboratory analysis for confirmation. Take necessary action recommended in laboratory analysis such as top dressing with soil sulfur, leaching soil, etc.

3.14 FINAL PLANTING REVIEW AND ACCEPTANCE, per Section 01710.

A. At the conclusion of the Maintenance Period, schedule a final review with the Owner, the Owner's maintenance person, and the Landscape Architect. On such date, all project improvements and all corrective work shall have been completed. If all project improvements and corrective work are not completed, continue the planting establishment, at no additional cost to the Owner, until all work has been completed. This condition will be waived by the Owner under such circumstances wherein the Owner has granted an extension of time to permit the completion of a particular portion of the work beyond the time of completion set forth in the Agreement.

B. Submit written notice requesting review at least 10 days before the anticipated review.

C. Prior to review, weed and rake all planted areas, repair plant basins, mow and edge turf, plumb tree stakes, clear the site of all debris and present in a neat, orderly manner.

END OF SECTION
SECTION 03310

CONCRETE WORK

PART 1 - GENERAL

1.01 SUBMITTALS

A. Submit shop and placement drawings of all reinforcing.

1. Placement drawings shall show the locations and spacing of reinforcing in the various parts of the structure with details as required, in accordance with ACI Detailing Manual. Cutting and bending lists submitted without placement drawings will be returned without review as incomplete. Placement drawings shall be complete so that placement of the reinforcing may proceed without reference to the design drawings.

2. Mechanical couplers: Where mechanical couplers are required or permitted to be used to splice reinforcement steel, manufacturer's literature shall be submitted which contains instructions and recommendations for installation for each type of coupler used; certified test reports which verify the load capacity of each type and size of coupler used; and shop drawings which show the location of each coupler with details of how they are to be installed in the formwork.

B. Submit mill tests and manufacturer's certification of compliance with CBC. Provide the following tests:

1. Portland Cement Test: One sample shall be taken for each 100 tons of cement except when used in bulk loading ready mix plants where separate bins for pre-tested cement are not available, grab samples shall be taken for each shipment of cement placed in the bin with not less than one sample being taken for each day's pour and such samples shall be subsequently tested if required by the Architect.

   a. For normal weight concrete, test aggregates in accordance with ASTM C33.

   b. Tests on component materials and for compressive strength and shrinkage of concrete will be performed as specified herein. Test for determining slump will be in accordance with the requirements of ASTM C 143.

2. Tests of Reinforcing Bars: Where samples are taken from bundles as delivered from the mill, with the bundles identified as to heat number, and provided the mill analyses accompany the report then one tensile test and one bend test shall be made from a specimen from each 10 tons or fraction thereof of each size of reinforcing steel.

   a. Where positive identification of the heat number cannot be made or where random samples are to be taken, then one series of tests shall be made from each 2-1/2 tons or fractions thereof, of each size of reinforcing steel.

3. Batch Plant Inspection: Except as provided below, the quality and quantity of materials used in transit mixed concrete and in batched aggregate shall be continuously inspected at the location where materials are measured by a specially approved inspector.
a. Exception: Batch plant inspection may be waived if the concrete plant complies fully with the requirements of CBC Standard 19-4 and has been certified to comply with the requirements of the National Ready Mix concrete Association. The plant must be equipped with an automatic batcher in which the total batching cycle, except for the measuring and introduction of an admixture, is completed by activating a single starter device.

4. Placing Record: A record shall be kept on the work of the time and date of placing the concrete in each portion of the structure. Such record shall be kept until the completion of the structure and shall be open to the inspection of the Architect.

5. Composite Construction Cores: Three test cores of the completed concrete construction shall be taken to demonstrate the shear strength along the contact surfaces. The cores shall be tested when the cast in place concrete is approximately 28 days old and shall be tested by a shear loading parallel to the joint between the precast concrete and the cast in place concrete. The minimum unit shear strength of the contact surface area of the core shall be not less than 100 pounds per square inch. The Architect or his representative shall designate the location for sampling.

6. Grout

a. Compression test specimens will be taken during construction from the first placement of each type of grout, and at intervals thereafter as selected by the Architect to insure continued compliance with these specifications. The specimens will be made by the Architect or its representative.

b. Compression tests and fabrication of specimens for cement grout and non-shrink grout will be performed as specified in ASTM C 109 at intervals during construction as selected by the Architect. A set of three specimens will be made for testing at 7 days, 28 days, and each additional time period as appropriate.

c. Compression tests and fabrication of specimens for epoxy grout will be performed as specified in ASTM C 579, Method B, at intervals during construction as selected by the Architect. A set of three specimens will be made for testing at 7 days, and each earlier time period as appropriate.

d. All grout, already placed, which fails to meet the requirements of these specifications, is subject to removal and replacement at the cost of the Contractor.

e. The cost of all laboratory tests on grout will be borne by the Owner, but the Contractor shall assist the Architect in obtaining specimens for testing. However, the Contractor shall be charged for the cost of any additional tests and investigation on work performed which does not meet the specifications. The Contractor shall supply all materials necessary for fabricating the test specimens.

C. Submit mix design a minimum of seven days prior to placement. Provide the following submittals in accordance with ACI-301:

1. Mill tests for cement.

2. Admixture certification. Chloride ion content must be included.
3. Aggregate gradation and certification.

D. Product Data: Submit manufacturer’s product data for all material provided and installed under this section of work, including curing compounds, colored concrete and concrete sealer.

E. Samples: Submit the following:
   1. Provide 8 foot (minimum) square test sample of concrete for each color and pattern indicated. Samples must be reviewed and approved prior to scheduling actual concrete pours. Samples shall be finished with appropriate High Density or Polished finish prior to final approval of samples.

F. Grout: Submit the following:
   1. Manufacturer's literature containing instructions and recommendations on the mixing, handling, placement, and appropriate uses for each type of non-shrink and epoxy grouts proposed for use in the WORK.
   2. Certified test results verifying the compressive strength, shrinkage, and expansion properties for proposed non-shrink and epoxy grouts.

1.02 PRODUCT DELIVERY

A. Storage of Materials: Cement and aggregates shall be stored at the work in such manner as to prevent deterioration or intrusion of any foreign matter. Cement shall be kept dry and any material which has deteriorated or which has been damaged shall not be used.

1.03 WORK SPECIFIED ELSEWHERE

A. Section 03350, High Density and Polished Concrete Floor Finish

PART 2 - PRODUCTS

2.01 CONCRETE MATERIALS

A. Normal Weight Aggregates: Normal sand-gravel aggregates conforming to ASTM C 33. The coarse aggregates shall be prepared and handled in two or more size groups for combined aggregates with a maximum size greater than 3/4-inch.

B. Cement: "Standard Specifications for Portland Cement" ASTM C 150, Type II.

C. Water: Potable, clean and free from deleterious amounts of acids, alkali, oil, or organic materials.

D. Admixtures: All admixtures shall be compatible and by a single manufacturer capable of providing qualified field service representation. Admixtures shall be used in accordance with manufacturer’s recommendations. If the use of an admixture is producing an inferior end result, the Contractor shall discontinue use of the admixture. Admixtures shall not contain thiocyanates nor more than 0.05 percent chloride ion, and shall be non-toxic after 30 days.

1. Air-entraining agent meeting the requirements of ASTM C 260 shall be used. Sufficient air-
entraining agent shall be used to provide a total air content of 3 to 5 percent. The Owner reserves the right, at any time, to sample and test the air-entraining agent received on the job by the Contractor. The air-entraining agent shall be added to the batch in a portion of the mixing water. The solution shall be batched by means of a mechanical batcher capable of accurate measurement. Air content shall be tested at the point of placement.

2. Set controlling and water reducing admixtures: Admixtures may be added at the Contractor's option to control the set, effect water reduction, and increase workability. The addition of an admixture shall be at the Contractor's expense. The use of an admixture shall be subject to acceptance by the Architect. Concrete containing an admixture shall be first placed at a location determined by the Architect. Admixtures specified herein shall conform to the requirements of ASTM C 494. The required quantity of cement shall be used in the mix regardless of whether or not an admixture is used.

    a. Concrete shall not contain more than one water reducing admixture. Concrete containing an admixture shall be first placed at a location determined by the Architect.
    
    b. Set controlling admixture shall be either with or without water-reducing properties. Where the air temperature at the time of placement is expected to be consistently over 80 degrees F, a set retarding admixture shall be used.
    
    c. Normal range water reducer shall conform to ASTM C 494, Type A. The quantity of admixture used and the method of mixing shall be in accordance with the Manufacturer's instructions and recommendations.

2.02 REINFORCING MATERIALS

A. Reinforcing bars, except as otherwise indicated, shall be new, deformed steel conforming to ASTM A 615, grade 60.

B. All reinforcing to be welded shall be ASTM A706, grade 60.

C. Accessories shall include all necessary chairs, slab bolsters, concrete blocks, tie wires, dips, supports, spacers, and other devices to position reinforcement during concrete placement. Concrete blocks (dobies), used to support and position reinforcement steel, shall have the same or higher compressive strength as specified for the concrete in which it is located. Wire ties shall be embedded in concrete block bar supports.

D. Mechanical Couplers

    1. Mechanical couplers shall be provided where shown and where approved by the Architect. The couplers shall develop a tensile strength which exceeds 125 percent of the yield strength of the reinforcement bars being spliced at each splice.
    
    2. Where the type of coupler used is composed of more than one component, all components required for a complete splice shall be supplied. This shall apply to all mechanical splices, including those splices intended for future connections.
    
    3. The reinforcement steel and coupler used shall be compatible for obtaining the required strength of the connection. Straight threaded type couplers shall require the use of the next larger size reinforcing bar or shall be used with reinforcing bars with specially forged ends which provide upset threads which do not decrease the basic cross section of the bar.
4. Contractor shall submit manufacturer catalog showing conformance with specifications and location where it will be used for approval by Architect.

2.03 JOINT MATERIALS

A. Premoulded Expansion Joint Filler: 1/2" thick, depth as required by slab thickness of pre-moulded, resilient, non-bituminous material.

B. Joint Cap: Plastic expansion joint cover cap with removable cover to receive sealant, by White Cap, JP Specialties, or equal.

C. Sealant: Expansion joint sealer and backer rod shall be in accordance with Section 07920.

2.04 FORM MATERIALS

A. Forms for Unexposed Finish Concrete: Form concrete surfaces which will be unexposed in finished structure with plywood, lumber, metal or other acceptable material. Provide lumber dressed on at least 2 edges and one side for tight fit.

B. Forms for Exposed Finish Concrete: Form concrete surfaces which will be exposed in finished structure with plywood, metal, metal framed plywood faced, or other acceptable panel type materials to provide continuous, straight, smooth exposed surfaces. Provide in largest practical sizes to minimize joint locations and to conform to joint layout indicated.

   1. Use plywood complying with US Product Standards PS-1, "B-B (Concrete Form) Plywood", Class I, Exterior Grade or better, mill-oiled and edge sealed, with each piece bearing legible inspection trademark.

C. Form Coatings: Provide commercial formulation form-coating compounds that will not bond with, stain nor adversely affect concrete surfaces, and will not impair subsequent treatments of concrete surfaces.

D. Forms for decorative finish concrete retaining walls: Form material shall be “Devil’s Slide Strata” By Spec Formliners Inc. (www.specformliners.com), or equal.

2.05 MISCELLANEOUS

A. Curing Paper: ASTM C 171, reinforced, non-staining type.

B. Curing Compound: Liquid membrane forming compound conforming to ASTM C 309, Type 1, Class B, all-resin and free of paraffin or petroleum. Curing compound and areas receiving it must be approved in advance by the Architect.

   1. Brand of curing compound to be used on slabs where resilient flooring is to be applied shall be approved by installer of resilient flooring.

   2. No sealer or curing compound shall be applied to concrete surfaces which are to receive ceramic tile. All surfaces must be cured a minimum of 28 days prior to tile installation.

   3. Curing compound where the interior finished floor surface is exposed concrete shall be clear sealer hardener as specified.

C. Sand Fill for Concrete Slabs on Grade: Imported clean sand.
D. Vapor Barrier Stego Wrap (15-mil) Vapor Barrier by STEGO INDUSTRIES LLC, San Juan Capistrano, CA (877) 464-7834 [www.stegoindustries.com], WR Meadows or equal.

1. Provide vapor retarding tape, vapor proof mastic and pipe boots per manufacturer’s recommendation.

E. Non-Shrink Grout: Sika, Master Flow, or equal, non-shrink, non-metallic grout. Non-shrink grout shall be a prepackaged, inorganic, non-gas-liberating, non-metallic, cement-based grout requiring only the addition of water. Manufacturer's instructions shall be printed on each bag or other container in which the materials are packaged. The specific formulation for each class of non-shrink grout indicated herein shall be that recommended by the manufacturer for the particular application.

1. Class B non-shrink grouts shall have a minimum 28 day compressive strength of 5000 psi and shall meet the requirements of CRD C 621.
   a. Class B non-shrink grout shall be used for the repair of all holes and defects in concrete members which are not water-bearing and not in contact with soil or other fill material, grouting under all base plates for structural steel members, and grouting railing posts in place.
   b. Prepackaged grouts shall have ingredients measured by means recommended by the manufacturer.

F. Gravel: Pea gravel not to exceed 3/8 inch maximum particle size.

G. Detectable Warning Surface: Cast-In-Place Composite Paver Tiles by ADA Solutions Inc. ([www.adatile.com]), or equal. Provide in 36” x width of sidewalk sections unless noted otherwise. Color shall be Yellow.

H. Exterior Concrete Sealer: Glaze & Seal, enhanced.

J. Final Seal: UL-390 E-Zee Seal, by Hanson-Loran.

K. Integral color: Color Flo liquid pigments, by Solomon Colors, Davis Colors, LM Schofield Company. Color shall be as indicated.

2.06 MIXES

A. Provide mix design in accordance with ACI 318. Include manufacturer literature for all admixtures used in mix design.

B. Provide concrete of the strengths indicated in the structural general notes.

C. Base mix design on maximum 4” slump for normal weight concrete with a maximum water-cement ratio of 0.45.

D. Ready-Mix Concrete: Mixed and delivered in accordance with the requirements of ASTM C 94.

1. Concrete may be rejected if not placed in final position within 1-1/2 hours after water is first added to the batch, or if not in such condition that it can be properly placed.

2. Each mixer truck shall be accompanied by a Public Weighmaster's Certificate.
PART 3 - EXECUTION

3.01 FORMS

A. All forms shall conform to the shape, lines, and dimensions of the members as called for on the plans, and shall be substantial and sufficiently tight to prevent leakage of mortar. Provide openings in formwork as required.

B. Construction: Conform to the requirements of ACI-347 "Recommended Practice for Concrete Formwork", except as modified herein. Provide chamfers as noted or detailed, otherwise provide square corners. Provide offsets, recesses, etc., as required.

C. Form Coatings: Coat contact surfaces of forms with a form-coating compound before reinforcement is placed. Apply in accordance with manufacturer’s recommendations.

D. Inserts and Anchors: Comply with ACI-318 "Building Code Requirements for Reinforced Concrete", for embedded conduits and piping, except as modified by the drawings.
   1. Carefully check all other trades before completing forms and placing concrete to determine that all embedded items are in place.
   2. Set all miscellaneous anchors, bolts, ties, dowels, plates, etc. All must be set and tied prior to pouring.
   3. Cooperate completely with other trades in the proper settings, aligning and securing of all items built into and dependent on the concrete work.

E. Forms shall be reviewed by the Architect prior to concrete pour.

F. Removal of Forms: The supporting forms shall not be disturbed until the concrete has hardened sufficiently to permit their removal with safety.
   1. In no case shall the forms be removed from walls and footings sooner than five days.
   2. Forms shall be removed in accordance with requirements of the ACI-347 "Recommended Practice for Concrete Formwork" without damage to concrete and in a manner to ensure complete safety of the structure.
   3. Freshly stripped surfaces shall not be painted up or touched in any manner before having been inspected.

3.02 PLACING REINFORCEMENT

A. All reinforcement shall be bent and placed in accordance with the "Code of Standard Practice" of the Concrete Reinforcing Steel Institute. All steel shall be thoroughly cleaned of mill scale, rust and coatings that will destroy or reduce the bond. Steel shall be accurately positioned and secured in place with annealed wire of not smaller than No. 14 gage.

B. All horizontal slab and pavement steel shall be supported on precast concrete blocks or approved
chairs of the proper size and spaced so as to keep the steel at the proper height in the slab.

C. Provide UFER ground consisting of steel reinforcing bar of at least 1/2” diameter at least 20' in length encased in concrete foundation at telephone and electric room per National Electric Code and as indicated.

D. Fabrication

   1. Reinforcement steel shall be accurately formed to the dimensions and shapes shown, and the fabricating details shall be prepared in accordance with ACI 315 and ACI 318, except as indicated. Stirrups and tie bars shall be bent around a pin having a diameter not less than 1-1/2-inch for No. 3 bars, 2-inch for No. 4 bars, and 2-1/2-inch for No. 5 bars. Bends for other bars shall be made around a pin having a diameter not less than 6 times the bar diameter, except for bars larger than 1 inch, in which case the bends shall be made around a pin of 8 bar diameters. Bars shall be bent cold.

   2. The Contractor shall fabricate reinforcement bars for structures in accordance with bending diagrams, placing lists, and placing drawings.

   3. Fabricating Tolerances: Bars used for concrete reinforcement shall meet the following requirements for fabricating tolerances:

      Sheared length:  + 1 inch
      Depth of truss bars:  + 0, - 1/2 inch
      Stirrups, ties, and spirals:  + 1/2 inch
      All other bends:  + 1 inch

E. Unless otherwise specified, reinforcement placing tolerances shall be within the limits specified in Section 7.5 of ACI 318 except where in conflict with the requirements of the CBC.

3.03 CONCRETE PLACEMENT

A. Concrete shall not be placed until all reinforcement is securely and properly fastened in its correct position and items required to be embedded in the concrete have been placed and anchored, forms cleaned and oiled as specified; and until the form work has been reviewed by the Architect for general conformance to the construction documents.

B. All concrete shall be placed upon clean, damp surfaces free from standing water, and never upon soft mud, dry porous earth, or upon fills that have not been subject to approved puddling or tamping so that ultimate settlement has occurred.

   1. Concrete shall not be placed in water nor shall water be allowed to rise over freshly placed concrete until the concrete has obtained its final set.

C. Concrete shall be deposited in approximately horizontal layers, not to exceed twelve inches in thickness, unless otherwise authorized, and the pour shall be carried on in a continuous operation, as far as practicable, until the placing in the course, section, panel or monolith is completed.

D. Concrete in foundation walls shall be consolidated with the aid of approved mechanical vibrating equipment. The intensity, duration, and vibration shall be sufficient to accomplish thorough compaction. The concrete shall be compacted and worked in an approved manner into all corners and angles of the forms and around reinforcement and embedded fixtures.
E. Concrete Floor Slabs on Grade:

1. After all utilities or other installations required under the slab have been installed, place 4” of sand over compacted grade and then place vapor barrier over sand in accordance with manufacturer’s recommendations.

3.04 CURING

A. Protect freshly placed concrete from premature drying and excessive cold or hot temperatures.

1. Initial Curing: Initial curing shall immediately follow the finishing operation. Concrete shall be kept continuously moist for a minimum of three days. One of the following methods shall be used.

   a. Ponding or continuous sprinkling.

   b. Absorptive mat or fabric kept continuously wet.

B. Curing Compounds for non-exposed Concrete Areas

1. Slabs-On-Grade: Apply specified curing compound to concrete faces.

   a. Apply uniformly in continuous operation by power sprayer or roller in accordance with manufacturer’s recommendations. No sealer or curing compound shall be applied to concrete surfaces which are to receive ceramic tile. All surfaces must be cured a minimum of 28 days prior to tile installation.

   b. Maintain continuity of coating and repair damage during curing period.

   c. Protect surfaces from abrasion during curing period.

3.05 MONOLITHIC SLAB FINISHES

A. After screeding and leveling concrete to proper elevation, tamp with heavy grille tamper until at least 3/8” of mortar has been brought to the surface; as soon as the surface becomes workable, work with float, pushing down all coarse aggregate, filling all holes and leveling surface to a true and even surface, level, or sloped as detailed.

1. Refer to drawings for location of finishes.

B. Slabs to receive ceramic tile shall be floated to a uniform sandy finish. Surfaces shall be left clean, free of dust, oil, grease, wax, tar, paint, curing agents, sealers, form release agents or and deleterious substance which may reduce or prevent tile adhesion.

C. Smooth Trowel Finish (For interior concrete finish floors and sub-floors for resilient flooring and carpet): Float and trowel to a perfectly smooth finish. Steel trowel finish shall be composed of at least three separate steel trowel operations.

3.06 EXTERIOR SLAB FINISHES

A. After screeding and leveling concrete to proper elevation, tamp with heavy grille tamper until at least
3/8" of mortar has been brought to the surface; as soon as the surface becomes workable, work with float, pushing down all coarse aggregate, filling all holes and leveling surface to a true and even surface, level, or sloped as detailed.

1. Refer to drawings for location of finishes.

B. All exterior walking surfaces not indicated otherwise shall be have a medium broomed finish (Coefficient of Friction .60).

3.07 FINISHING FORMED SURFACES

A. Rough-Formed Surfaces: Provide a rough-formed finish on formed concrete surfaces not exposed to view in the finished work. This is the concrete surface having texture imparted by form facing material used, with tie-holes and defective areas repaired and patched, and fins and other projections exceeding 1/4 inch in height rubbed down or chipped off.

B. Smooth-Formed Surfaces: Provide a smooth-formed finish on formed concrete surfaces exposed to view in the finished work. This is an as-cast concrete surface with selected form facing material, arranged in an orderly and symmetrical manner, with a minimum of seams. Repair and patch defective areas with fins and other projections completely removed and smoothed.

C. Related Uniform Surfaces: At tops of walls, horizontal offsets, and similar uniformed surfaces adjacent to a formed surface, strike off smooth and finish with a texture to match the adjacent formed surface. Continue final surface treatment of formed surfaces uniformly across adjacent unformed surfaces unless otherwise indicated.

3.08 JOINTS

A. Locate as indicated on the drawings.

B. Construction Joints: Wet hardened concrete and keep wet for twenty-four hours before placing concrete.

C. Interior Slab Control Joints: Provide expansion and weakened plan control joints where indicated on drawings. Install as indicated and according to manufacturer's instructions.

1. Sawcut joints will only be permitted where approved in advance by Architect.

2. All sawcutting of joints must be completed within 8 hours of concrete pour.

D. Expansion joints shall receive expansion material and sealant as specified. Provide void caps over all expansion joints. After curing, detach removable cap and seal. Install in accordance with Section 07920, Sealants. Finish sealant to 1/8 inch below surface of slabs. No traffic shall be permitted over sealed joints until sealant is thoroughly dry.

3.09 PATCHING AND FINISHING

A. All exposed concrete which is above grade and is not formed as shown on the drawings, or for any reason is out of alignment, or is not true, or is not plumb or level, or is not in plane, or shows a defective surface, or is not otherwise in true and continuous form, shall be considered as not conforming with the intent of the specifications.

1. The maximum permissible deviation from true straight surfaces shall be 1/8" in ten feet.
2. All surfaces not meeting the above requirements shall be machine ground and honed to come within the above tolerance or shall be removed and replaced.

B. Contractor shall remove defective concrete from the job, or if permission is given, patch defective concrete at no cost to the Owner. Removal shall be accomplished by sawcutting around the defective area at the nearest construction joint.

C. After the forms have been removed, all concrete surfaces shall be inspected and any pour joints, voids, stone pockets or other defective areas permitted by Architect to be patched, and all tie holes, shall be patched before the concrete is thoroughly dry.
   1. Defective areas shall be chipped away to a depth of not less than one inch with the edges perpendicular to the surface.
   2. The area to be patched and a space of at least six inches wide entirely surrounding it shall be wetted to prevent absorption of water from the patching mortar.
   3. A grout of equal parts of Portland cement and sand with sufficient water to produce a brushing consistency shall then be well brushed into the surface, followed immediately by the patching mortar.
   4. The patch shall be finished in such manner as to match the adjoining surface in both texture and color.

3.10 SEALING

A. Thoroughly clean all exposed concrete surfaces per manufacturer's recommendations, to provide a clean, dust free surface.

B. After allowing the surface to dry, apply the two-component sealer in accordance with manufacturer's recommendations.

3.11 GROUTING PROCEDURES

A. Prepackaged Grouts: All mixing, surface preparation, handling, placing, consolidation, curing, and other means of execution for prepackaged grouts shall be done according to the instructions and recommendations of the manufacturer.

B. Base Plate Grouting:
   1. For base plates, the original concrete shall be blocked out or finished off a sufficient distance below the plate to provide for a one-inch thickness of grout or a thickness as indicated.
   2. After the base plate has been set in position at the proper elevation by steel wedges or double nuts on the anchor bolts, the space between the bottom of the plate and the original pour of concrete shall be filled with non-shrink-type grout. The mixture shall be of a trowelable consistency and tamped or rodded solidly into the space between the plate and the base concrete. A backing board or stop shall be provided at the back side of the space to be filled with grout. Where this method of placement is not practical or where required by the Architect, alternate grouting methods shall be submitted for acceptance.
SECTION 03350
HIGH DENSITY AND POLISHED CONCRETE FLOOR FINISH

PART 1 - GENERAL

1.01 SUMMARY

A. Section includes cleaning, preparation, application of HD Concrete Flooring (HDCF), sawcuts, grouting, sealing, application of maintenance coat, and protection in the Apparatus Area and as indicated. This work shall include providing and applying the special concrete with T. B. Penick and Sons HDCF in accordance with the provision of the plan documents and other sections of the Contract Documents.

B. Concrete must be cured to a minimum of 28 days prior to HD System.

C. Related documents: The conditions of the Contract apply to this section as fully as if repeated herein.

1.02 SUBMITTALS

A. Submit product data and MSDS sheets for material to be used for HDCF.

B. VOC Emissions from stains and coatings must not exceed the VOC and chemical component limits of the Green Seal’s Standard GS-11 requirements.

C. Provide two (2) 8’ x 8’ samples for each of the finishes specified in both 60 grit and 80 grit for approval prior to commencing work. Samples shall be poured two weeks prior to the time the slab is scheduled to be poured and shall be approved by Architect and Fire Department prior to work commencing on actual slab.

D. Submit evidence of certified quality control procedures and experience. Installer qualifications for experience, demonstration of square footage installed, number of projects, and contact information to verify experience as indicated in Quality Control section of this specification.

1.03 QUALITY ASSURANCE

A. Quality standards: The standards named herein are specified to establish standards of quality, performance and compliance with the design concrete, which is to duplicate the color of the approved “referee sample”.

B. Single Source Responsibility: Obtain each color, type, and variety and joint materials from a single source with resources to provide products and materials of consistent quality in appearance and physical properties without delaying work.

C. Field Constructed Mock-Up: Prior to the installation of any HD, erect mock-ups for each type and pattern of concrete required to verify selections made under sample submittals. Build mock-ups to comply with the following requirements, using materials and same base construction including special features for expansion joints, construction joints, surface finishes, textures, colors and contiguous work as indicated for final work.

1. Field Quality Control submittals as specified in Part 3 of this Section.
2. Locate mock-ups on site in location and size indicated or if not indicated, as directed by Architect.

3. Demonstrate quality and range of aesthetic effects and workmanship that will be produced in final unit of work and accurately match pre-bid “referee sample”.

4. Obtain Owner’s Authorized Representative acceptance of mock-ups before start of work.

PART 2 - PRODUCTS

2.01 MATERIALS

A. Special surface colors shall be performed using approved colors suitable for the purpose intended and applied in a manner consistent with the design intent of the project. Color shall be as selected by Architect from manufacturer’s standard colors.

B. Impregnator: Ameripolish 3D, HS, Hybrid Silicate Densifier, by Ameripolish, or equal.

C. Sealer: Ameripolish 3D, SP, by Ameripolish, or equal.

D. All material shall be furnished, prepared, applied, cured and stored according to Product Manufacturer directions specified for use intended as specific herein, with special attention given to recommended temperature range for penetrating color mix.

PART 3 - EXECUTIONS

3.01 PREPARATION

A. Preparation: Clean concrete to ensure the surface is free of all latency, dirt, dust, grease, paint and any foreign material prior to the color application in accordance with the color manufacturer’s recommendations.

B. Verify that concrete slab meets a minimum of 4000 psi of compressive strength, contains no air-entraining admixtures and has a minimum flatness rating of F35. Consult American Concrete Institute ACI302.IR-89, Guide for Concrete Floor and Slab Construction Requirements in Division 3 Section A Cast-In-Place Concrete and Project Conditions.

3.02 APPLICATION

A. Grind concrete with 40 grit up to 800 grit until there is a uniform scratch pattern and desired concrete exposure is achieved per mockup.

a. Polished Concrete floor finish shall only require 80 grit up to 320 grit.

B. Apply material approved by architect for color effects in accordance with architectural drawings and manufacturer guidelines.

C. Bull float cementitious grout onto surface to fill all voids, cement grout to match color of concrete; allow to cure overnight.

D. Apply a densifying impregnator per manufacturer’s instructions. Cover the entire work area
liberally and allow to sit for 10 minutes. Apply again to areas where the densifying impregnator has soaked in and allow to sit for an additional 30 minutes. Squeegee excess material off the floor. Allow 12 to 24 hours for full cure.

E. Polish the surface to match approved sample.

3.03 SEALER

A. Allow impregnator to completely dry prior to application.
B. The surface shall be sealed with Prosoco LS Guard.
C. Apply per manufacturer’s instructions.
D. Allow sealer to dry before applying second coat.
E. Burnish between each coat.
F. Apply additional coats per manufacturer’s instructions (minimum of three).

3.04 CLEAN UP

A. During the progress and at the completion of the work, remove all trash, debris, etc. from the project site and leave the site clean and in an orderly condition.

3.05 PROTECTION

A. Protect applied colors from adverse climatic conditions during application and curing.
B. All special finishes of concrete surfaces shall be protected until final acceptance of the project.
C. Protect floor from traffic for at least 24 hours after final application of sealer.
D. After sealer has dried sufficiently, install double faced 125# corrugated cardboard sheets on the stained floors. Tape together. Do not tape cardboard directly to stained floors.
G. Provide floor care manual

END OF SECTION
PART 1 - GENERAL

1.01 QUALITY ASSURANCE

A. Codes and Standards:

B. Concrete block shall be tested in accordance with ASTM C 140.

C. Prisms shall be made and tested in accordance with Method B of ASTM E 447.

1.02 SUBMITTALS

A. Certification: Prior to deliver of concrete masonry materials to the job site, deliver to the Architect a letter from the manufacturer of the proposed masonry units certifying that all such units to be delivered to the job site are in strict conformance with the provisions of this Section.

B. Submit manufacturer's data for all products and materials used and specified herein.

C. Samples: Submit sample sections of block and mortar to be used on the project.

PART 2 - PRODUCTS

2.01 CONCRETE BLOCKS

A. Blocks shall conform to the requirements of ASTM C 90, Type I, medium weight, and open end. Provide special shapes where required for lintels, corner jambs, sash, control joints, headers, bonding and other special conditions. Sizes shall be as indicated on the drawings.

   1. Units shall be 8x8x16 and 16x8x16 split faced or precision block as indicated, by Basalite, Orco, or approved equal. Color shall be as indicated

2.02 MORTAR

A. All mortar for concrete block shall conform to ASTM C 270 and shall have compressive strength indicated on Drawings.

B. Mortar shall be freshly prepared and uniformly mixed and be of spreadable, workable consistency.

C. Mortar should be retempered with water as required to maintain high plasticity. Retempering on mortar boards shall be done only by adding water within a basin formed with the mortar and the mortar worked into the water. Any mortar which is unused after two and one-half hours from the initial mixing time shall not be used.
D. After all ingredients are in the batch mixer they shall be mechanically mixed for not less than three minutes.

E. If mortar is to be colored, inert coloring pigments may be used, but not to exceed six percent by weight of cement.

F. The use of fire clay, rock dust, dirt and other deleterious materials is prohibited in mortar.

G. Sand for mortar shall conform to ASTM C 144.

H. Color of mortar shall be #MC86, by Davis Colors, or equal.

2.03 REINFORCEMENT STEEL

A. Reinforcement Bars: New, deformed billet steel bars conforming to ASTM A 615, Grade 60.

B. Deliver bars new and free from rust and mill scale in original bundles with mill tags intact.

2.04 GROUT

A. Grout shall conform to ASTM C 476 requirements and shall have minimum strength indicated on Drawings.

B. Fine grout shall be proportioned by volume of one part portland cement and 2-1/4 to 3 parts sand.

C. Coarse grout shall be proportioned by volume, shall consist of one part portland cement, 2-1/4 to 3 parts sand and one to 2 parts coarse aggregate.

D. Laboratory design mixes are acceptable in lieu of the above proportions and are required if the minimum strength is more than 2000 psi. Grout shall be of fluid consistency with proper proportions of sand to gravel for pouring or pumping.

E. Aggregate for masonry grout shall conform to ASTM C 404.

2.05 JOINT MATERIALS

A. Premoulded Expansion Joint Filler: 1/2" thick, depth as required by wall thickness, of premoulded, resilient, non-bituminous material.

B. Sealant: Expansion joint sealer and backer rod shall be in accordance with Section 07920.

2.06 OTHER MATERIALS

A. All other materials, not specifically described but required for a complete and proper installation of the work of this Section, shall be as selected by the Contractor subject to acceptance by the Architect.

PART 3 - EXECUTION

3.01 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 unsatisfactory conditions have been corrected.
3.02 COORDINATION
A. Carefully coordinate with all other trades to ensure proper and adequate interface of the work of other trades with the work of this Section.

3.03 MIXING MORTAR
A. Use a mechanical mixer of one sack minimum capacity. Mix mortar for at least three minutes after all materials have been added. Mix only as much mortar as can be used in one hour after water has been first mixed into the batch.

3.04 INSTALLATION
A. Masonry shall not be started when the horizontal and vertical alignment of the foundation is out of plumb or line one inch or more.
B. Care shall be taken to prevent grout and mortar stains. Keep wall continually clean; if grout does run over, clean immediately.
C. All masonry shall be laid true, level and plumb in accordance with the Drawings.
D. The masonry units shall be cut accurately to fit all plumbing, ducts, openings, electrical work, etc., and all holes are to be neatly patched.
E. No construction support shall be attached to the wall except where specifically permitted by the Architect.
F. The top surface of the concrete foundation shall be clean and free of laiticance and the aggregate exposed before starting masonry construction.
G. Where no bond pattern is shown, the wall shall be laid up in straight, uniform courses with regular half or running bond.
H. All work, bond patterns or special details as shown on the Drawings shall be accurately and uniformly executed.

3.05 JOINTS
A. The starting joint on foundations shall be laid with full mortar coverage on the bed joints except that the area where the grout occurs shall be free from mortar so that the grout will be in contact with the foundation.
B. Mortar joints shall be straight, clean, and uniform in thickness and shall be tooled concave. Unless otherwise specified or details on the plans, in hollow unit masonry the horizontal and vertical mortar joints shall be 3/8" thick.
C. Unless otherwise specified, all joints shall be tooled with a concave surface. Tooling shall be done when the mortar is partially set and still sufficiently plastic to bond. All tooling shall be done with a tool that compacts the mortar.
D. Vertical head joints shall be butted for a thickness equal to the face shell of the unit and these joints shall be shoved tightly so that the mortar bonds well with both units.
E. If it is necessary to remove a unit after it has been set in place, the unit shall be removed from the wall, cleaned and set in fresh mortar.
F. All work, bonds or special details shall be accurately and uniformly executed. Face joints shall be tooled as shown on the Plans and in the Specifications.

G. Provide control joints at a maximum spacing of 30 feet on center.

3.06 REINFORCING

A. When a foundation dowel does not line up with a vertical core, it shall be sloped at not more than one horizontal to six vertical. Dowels shall be grouted into a core in vertical alignment even though it is in an adjacent cell to the vertical wall reinforcing.

B. Reinforcing bars shall be straight except for bends around corners and where bends or hooks are detailed on the Plans.

C. Reinforcing steel where spliced shall be lapped a minimum of 40 bar diameters.

D. When full length vertical bars are used, they shall be held in position at top and bottom at intervals not exceeding 200 bar diameters of the reinforcement.

E. Horizontal reinforcing shall be laid on the webs of bond beam units and shall be solidly grouted in place. Reinforcing in channel units shall be spaced off the bottom of the unit.

F. Vertical reinforcing shall have a minimum clearance of 1/2" from the masonry.

3.07 GROUTING

A. General:
   1. Reinforcement shall be in place before grouting starts.
   2. Mortar droppings shall be kept out of a grout space.
   3. All grout shall be mechanically vibrated in place.
   4. Vertical cells to be filled shall have vertical alignment to maintain a continuous unobstructed cell area not less than two inches by three inches.
   5. Cells containing reinforcement shall be solidly filled with grout and pours shall be stopped one inch below the top of a course to form a key or joints.
   6. Grouting at beams over openings shall be done in one continuous operation.
   7. All cells containing reinforcement, anchor bolts and inserts shall be grouted solidly without exception. Unless otherwise noted, all walls are to be solid grouted (all cells filled with grout).
   8. Columns, beams, joists, and similar structural members shall be anchored to the wall with anchor bolts or their equivalent. Anchors shall be fully, solidly embedded in place. Embedment shall not be less than 2/3 of the wall thickness unless otherwise noted.
   9. Grout shall be poured in lifts of eight feet maximum height unless approved in advance in writing by the Architect.

END OF SECTION
SECTION 04730
MANUFACTURED STONE VENEERS

PART 1 - GENERAL

1.01 SECTION INCLUDES
   A. Manufactured Stone Veneers.
   B. Mortar.

1.02 REFERENCES
   F. UL 723: Test for Surface Burning Characteristics of Building Materials.

1.03 SUBMITTALS
   A. Submit manufacturer’s data for all products and materials used and specified herein.
   B. Samples: Submit sample sections of stone and mortar to be used on the project.

1.04 QUALITY ASSURANCE
   A. Applicator: Company experienced in installation of manufactured stone and veneers of the type specified, with minimum five years experience in similar installations. Submit a list of previous projects completed which utilized manufactured stone veneers.

1.05 MOCK UP
   A. Erect 3 X 6 sample panel for stone at job site at location as directed. Illustrate field pattern of stone, field cutting of units where required, and color and tooling of joints. Stone sample panel shall show corner condition and include the precast concrete cap at the top of the wainscot.
      1. Mock up panel shall not be used in the final work.
      2. Coordinate mock up with mock up specified in Section 09200.

1.06 DELIVERY, STORAGE, AND HANDLING
   A. Deliver products to site under provisions of Section 01600.
   B. Store and protect products under provisions of Section 01600.
C. Store mortar and other moisture-sensitive materials in protected enclosures; handle by methods which avoid exposure to moisture.

1.07 PROJECT CONDITIONS

A. Maintain materials and surrounding air temperature to minimum 45 degrees F. prior to, during, and for 48 hours after completion of work.

B. Protect materials from rain, moisture, and freezing temperatures prior to, during, and for 48 hours after completion of work.

C. Allow no construction activity on opposite side of wall during installation, and for 48 hours after completion of work.

1.08 WARRANTY

A. Provide manufacturer's lifetime material warranty under provisions of Section 01740. Also provide Contractor's 5 year warranty on installation.

PART 2 - PRODUCTS

2.01 STONE VENEER

A. Stone Veneer shall be manufactured by Eldorado Stone, by Stonecraft Industries, LLC (760) 736-3232. Pattern and color shall be as indicated.

1. Trim and veneer units may need to be field cut to provide shapes and sizes as indicated or required.

2.02 MORTAR

A. All mortar for stone veneer shall conform to ASTM C 150, Type I and shall have compressive strength indicated on Drawings for concrete block construction.

B. Mortar shall be freshly prepared and uniformly mixed and be of spreadable, workable consistency.

C. Mortar should be retempered with water as required to maintain high plasticity. Retempering on mortar boards shall be done only by adding water within a basin formed with the mortar and the mortar worked into the water. Any mortar which is unused after two and one-half hours from the initial mixing time shall not be used.

D. After all ingredients are in the batch mixer they shall be mechanically mixed for not less than three minutes.

E. If mortar is to be colored, inert coloring pigments may be used, but not to exceed six percent by weight of cement.

F. The use of fire clay, rock dust, dirt and other deleterious materials is prohibited in mortar.

G. Sand for mortar shall conform to ASTM C 144.
H. Color of mortar for exposed applications shall be selected by Architect from manufacturer’s standard colors.

2.03 MISCELLANEOUS MATERIAL

A. All other materials, not specifically described but required for a complete and proper installation of the work of this Section, shall be as selected by the Contractor subject to acceptance by the Architect.

B. Precast Concrete Sills: Shapes and sizes as indicated, by US Concrete Precast Group, Empire Precast, or equal.

C. Plaster Base Coat: As specified in Section 09200, Lath and Plaster.

PART 3 - EXECUTION

3.01 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 unsatisfactory conditions have been corrected.

3.02 COORDINATION

A. Carefully coordinate with all other trades to ensure proper and adequate interface of the work of other trades with the work of this Section.

3.03 APPLICATION

A. Concrete and Masonry Surfaces, New, Clean and Untreated: Examine newly poured concrete and masonry surfaces closely to ensure that its finished surface contains no releasing agents (form oil). If it does contain form oil, etch surface with muriatic acid, rinse thoroughly and/or score with a wire brush, or use high pressure water or sandblasting to remove.

3.04 MIXING MORTAR

A. Thoroughly mix mortar ingredients in quantities needed for immediate use in accordance with ASTM C 270, Type N. Use a mechanical mixer of one sack minimum capacity. Mix mortar for at least three minutes after all materials have been added. Mix only as much mortar as can be used in one hour after water has been first mixed into the batch.

3.05 CUTTING OF VENEER UNITS

A. Cut veneer units with wet-saw.

B. Pre-soak units using clean water prior to cutting.

C. Clean cut units using a stiff fiber brush and clean water. Allow units to surface dry prior to placement.

3.06 COURSING

A. Place veneer to lines and levels indicated.
1. Maintain veneer courses to uniform width.

2. Lay veneer units in a dry stack method using flat field unit and 90 degree corner unit where needed.

3.07 INSTALLATION

A. Veneer shall not be started when the horizontal and vertical alignment of the surface to be applied to is out of plumb or line one inch or more.

B. Care shall be taken to prevent mortar stains. Keep veneer surfaces continually clean.

C. All veneer shall be laid true, level and plumb in accordance with the Drawings.

D. Apply in accordance with Manufacturers Installation Instructions.
   1. Apply 1/2" to 3/4" of mortar to the back of the stone. Press the units firmly into position and apply slight pressure to unit to ensure firm bonding causing mortar to extrude slightly around edges of units.
   2. Place units with uniform mortar joints. Install outside corner return units with short and long lengths alternated.
   3. Plan the work to minimize job site cutting. Work stone from the top of the wall down. Perform necessary cutting with proper tools to provide uniform edges; take care to prevent breaking unit corners or edges.
   4. Remove excess mortar; do not allow mortar to set up on face of units.

E. The veneer units shall be cut accurately to fit all plumbing, ducts, openings, electrical work, etc., and all holes are to be neatly patched.

F. All work, bond patterns or special details as shown on the Drawings shall be accurately and uniformly executed.

3.05 PRECAST SILLS

A. Install in accordance with manufacturer’s installation instructions.

3.06 PROTECTION

A. Protect veneer units from damage resulting from subsequent construction operations.

B. Use protection materials and methods which will not stain or damage veneer units.

C. Remove protection materials upon Substantial Performance of the Work, or when risk of damage is no longer present.

3.07 CLEANING

A. Clean and finish joints in accordance with manufacturer’s instructions.

B. Clean and finish veneer in accordance with manufacturer’s instructions.
SECTION 05120

STRUCTURAL STEEL

PART 1 - GENERAL

1.01 SUBMITTALS

A. Submit shop Drawings including complete details and schedules for fabrication and shop assembly of members. Include details of cuts, connections, camber, holes, and other pertinent data. Indicate welds by AWS symbols, and show size, length, and type of weld. Provide setting drawings, templates, and directions for installation of anchor bolts and other anchorages. Identify details by reference to sheet and detail number on the Drawings.

1.02 QUALITY ASSURANCE

A. Fabrication and Erection:


2. All structural steel, both in the shop and in field shall be transported and handled and erected in such manner as will preclude any injury thereto and in no case shall the material be subjected to any undue stresses in any part of connection or member.

B. Coordination: Coordinate the work in the structural steel section with that of all other sections. Provide all punchings and drilling indicated on the drawings, or required for the attachment of their work to the structural steel framing for pipe and duct supports, anchors, aluminum sash, doors and similar work. Provide necessary drilling and punching; accurately locate and arrange to receive and engage the same.

C. Field Measurements: Before starting work, secure all field measurements pertaining to or affecting the work of this section and verify the locations and exact position of all anchor bolts occurring therein.

D. Certification of Materials: Identify all structural steel by heat or melt number and accompany with mill analysis and test reports. Furnish evidence to the Architect that the materials conform with the requirements of these specifications.

E. Design of Members and Connections: Details shown are typical; similar details apply to similar conditions, unless otherwise indicated. Verify dimensions at site whenever possible without causing delay in the work.

a. Promptly notify Architect whenever design of members and connections for any portion of structure are not clearly indicated.

1.03 TESTING

A. Testing Laboratory: A qualified testing laboratory shall be as approved by the Architect. Testing and inspection shall be as required by the Drawings and these Specifications.

B. Mill Tests and Inspection of Structural Steel:
1. Tests of Mill Order A 36 Steel: Where steel, ordered from the mill, cut to lengths, is identified by heat or melt numbers and is accompanied by mill analysis test reports, material shall be used without further local tests, provided an affidavit is given that materials conform with requirements. In case of controversy, tension and bend tests of materials, either locally or at mill, as required for local stock will be required.

2. Test of Unidentified Steel: In the event structural steel cannot be identified by heat or melt numbers and is accompanied by mill analysis and test report, such stock may be used, provided 1 tension and 1 bend test is made for each 50 tons or fractional part, of stock as may be used in work. Complete 4 sided surface inspection may be required for materials. Each piece of high-strength local stock steel shall be tested and stamped.

C. Any steel that cannot be identified or whose source is questionable shall be rejected and removed from the jobsite.

D. Inspecting the structural steel will be performed in the mill, shop and field but such inspections or tests shall not relieve the Contractor of his responsibility to furnish satisfactory materials. The Architect shall have the right to inspect and reject faulty materials or workmanship at any time prior to the final acceptance of the erected structural steel.

E. Tests of Welding and Bolting: An approved Testing Laboratory shall inspect shop and field welding and high tensile bolting. Testing laboratory shall comply with regulations of the local building inspection department and shall certify in writing, upon completion of work, that welding and high tensile bolting has been performed in accordance with the Drawings and Specifications and applicable city ordinances.

F. Testing of Complete Penetration Welds: The Testing Laboratory shall inspect welded connections of column to column, girder to column, or girder to girder by ultrasonic or other approved non-destructive tests.

1.04 PRODUCT DELIVERY, STORAGE AND HANDLING

A. Materials shall be delivered to the site in undamaged condition, stored in fully covered, well ventilated areas, and protected from the elements. Store materials above the ground upon platforms, pallets, skids or other supports. Keep materials free from dirt, grease and other foreign matter, and protect from corrosion. Material showing evidence of damage will be rejected. Immediately remove rejected materials from the work.

PART 2 - PRODUCTS

2.01 MATERIALS

A. All materials shall conform with the following requirements and shall be free from scale, defects and imperfections, of recent manufacture and unused. Where two or more identical articles or pieces of equipment are required, they shall be of the same manufacture.

B. Structural steel shall conform with ASTM A992 or A572, Grade 50 for shapes unless noted otherwise. Structural steel shall conform with ASTM A36 for plates and bars unless noted otherwise.
C. Welding electrodes shall conform with AWS D1.1, E70, series. Electrodes for welding reinforcing steel to be low hydrogen electrodes.

D. Headed Welded Studs: Nelson "Granular Flux-Filled Shear Connector and Anchor Studs," - "KSM Shear Connector Studs" or approved equal, manufactured of C1015, 1010, 1017, or 1020 cold-rolled steel conforming to ASTM A 108.

E. Pipe columns shall be ASTM A 53, Grade B.

F. Tube steel shall be ASTM A 500, Grade B, 46 ksi.

G. Galvanizing shall conform with ASTM A 123.

PART 3 - EXECUTION

3.01 WELDING

A. Structural welding shall be done by the electric submerged or shielded metal arc process and shall have inspection by the laboratory of record. Operators shall be thoroughly trained and experienced in arc welding of structures, capable of making uniformly reliable butt and fillet welds in flat, vertical and overhead positions and by producing neat and consistent work in actual operation. Each operator shall have passed all welding tests of the American Welding Society.

B. Surfaces to be welded shall be free of any paint, grease, loose scale and foreign matter. Clean welds each time the electrode is changed and chip clean all burned or flame- cut edges before welds are deposited thereon. The same electrode may be used with various thicknesses of plate, but change current used and number of passes made proportionately.

C. After being deposited, brush welds with wire brushes. Welds shall exhibit uniform section, smoothness of welded metal, feathered edges without undercuts or overlays, and freedom from porosity and clinkers. Visual inspection at edges and ends of fillet and butt joint welds shall indicate a good fusion with penetration into base metal.

D. During assembly and welding, hold component part of a built-up member with sufficient clamps or other adequate means to keep the parts straight and in close contact. In welding, precautions shall be taken to minimize "lockup" stresses and distortion due to heat. No welding shall be done under windy conditions until adequate wind protection screening has been provided. Any welds or parts of welds which are found to be defective shall be cut out with a chisel and replaced.

E. The maximum space between members to be butt welded shall not exceed 1/4", except at web doubler plates. Bevel all pieces or members up to 1/8" thickness to form a single or double "vee" before being welded. Bevel welds over 3/8" in thickness to form a double "vee" wherever possible.

F. Lay fillet welds in the position indicated on the drawings and to the sizes shown. In measuring fillet welds, consider only the effective portion. The maximum space between pieces for members to be fillet welded shall not exceed 1/16".

3.02 ERECTION
A. Erect all structural steel with qualified riggers and carefully plan and lay out so that a minimum of cutting shall be required. Erect work plumb, square and true to line and level, and in precise position, as indicated. Provide temporary bracing and guys, wherever necessary, to provide for the loads and stresses to which the structure may be subjected, including those due to erection equipment and their operation, and leave in place as long as it may be required for safeguarding all parts of the work.

B. As erection progresses, securely bolt up work as required to maintain the steel in proper position while field bolting and welding is being done and as required to take care of all deadloads, wind and erection stresses. No field bolting or welding shall be done until the work has been properly aligned, plumbed and leveled.

C. Set each column base plate in exact position as to alignment, plumb and height. The center of each base shall be true to the column center within a tolerance of 1/16", and its height shall be adjusted in exact position. Maintain all bases at the exact position and level while they are being grouted.

D. Carry out erection of structural steel work in proper sequence with the work of other trades, and frame, bed and anchor to concrete and related work in strict accordance with the detail drawings and approved setting drawings.

E. Field Modification: Written acceptance from the Architect must be obtained before using cutting torch for field modification or re-fabrication of structural steel. The structural steel fabricator shall be responsible for errors in fabrication and for correct fit in the field.

F. Allowable Tolerances: Comply with requirements of AISC Code of Standard Practice. Bases of all columns shall be located on the established column lines within plus or minus 1/8". All leveling and plumbing shall be based on a mean temperature of 70 degrees F. Compensate for difference in temperature at time of erection.

3.03 CONNECTIONS

A. Unfinished Bolts: Make field connections with unfinished bolts only where indicated.

3.04 ANCHOR BOLTS

A. Inspect the installation of anchor bolts, make all necessary field measurements and, if necessary, furnish templates to insure that all structural steel will fit the job conditions. Locate all columns as indicated on the drawings. Setting of anchor bolts in hardened or existing concrete, which may be necessary because of error or oversight, shall be made in suitable drilled holes and solidly grouted in place, under the direction of the Architect.

3.05 FINISH

A. Clean all steel of any grease, rust, mill scale or other foreign matter. Material to be embedded in concrete shall not be primed.

END OF SECTION
SECTION 05500

METAL FABRICATIONS

PART 1 - GENERAL

1.01 SUBMITTALS

A. Submit shop Drawings including complete details and schedules for fabrication and shop assembly of members. Indicate profiles, sizes, connection attachments, reinforcing, anchorage, size and type of fasteners, and accessories.

B. Include erection drawings, elevations, and details where applicable including but not limited to the following items:
   1. Fence & Gate Railings (elevate all pieces, not just a typical condition)
   2. Steel Bollards
   3. Desk Brackets

1.02 PRODUCT DELIVERY, STORAGE AND HANDLING

A. Materials shall be delivered to the site in undamaged condition, stored in fully covered, well ventilated areas, and protected from the elements. Store materials above the ground upon platforms, pallets, skids or other supports. Keep materials free from dirt, grease and other foreign matter, and protect from corrosion. Material showing evidence of damage will be rejected. Immediately remove rejected materials from the work.

1.03 QUALITY ASSURANCE

A. Fabrication and Erection:
   2. All structural steel, both in the shop and in field shall be transported and handled and erected in such manner as will preclude any injury thereto and in no case shall the material be subjected to any undue stresses in any part of connection or member.

B. Coordination: Coordinate the work in the structural steel section with that of all other sections. Provide all punching and drilling indicated on the drawings, or required for the attachment of their work to the structural steel framing for pipe and duct supports, anchors, aluminum sash, doors and similar work. Provide necessary drilling and punching; accurately locate and arrange to receive and engage the same.

C. Field Measurements: Before starting work, secure all field measurements pertaining to or affecting the work of this section and verify the locations and exact position of all anchor bolts occurring therein.

D. Certification of Materials: Identify all structural steel by heat or melt number and accompany with mill analysis and test reports. Furnish evidence to the Architect that the materials conform
with the requirements of these specifications.

E. Design of Members and Connections: Details shown are typical; similar details apply to similar conditions, unless otherwise indicated. Verify dimensions at site whenever possible without causing delay in the work.

1. Promptly notify Architect whenever design of members and connections for any portion of structure are not clearly indicated.

1.04 PERFORMANCE REQUIREMENTS

A. Design loads for the structural design and construction of the below listed fabrications are to satisfy applicable codes, but are to be not less than the minimum values specified herein.

B. Handrails, Railings, and Guardrails:

1. Handrails: Design handrails and their anchors capable of withstanding a concentrated load of 200 pounds applied at any point in any direction on the handrail, also a uniform load of 50 pounds per lineal foot applied simultaneously in both vertical and horizontal directions.

2. Railings and Guardrails: Design railings and guardrails and their anchors capable of withstanding a concentrated load of 200 pounds applied at any point in any direction along the top railing member, also a uniform load of 50 pounds per lineal foot applied horizontally at the required railing or guardrail height and a simultaneous uniform load of 100 pounds per lineal foot applied vertically downward at the top or the railing or guardrail.

4. Design and fabricate stair and ramp railings, handrails and guardrails in accordance with ASTM E 985.

5. When conflicts exist between the above specified load requirements and the specified standard, provide fabrications designed to the stringent or greater requirement.
   a. Testing performed according to ASTM E 894 and E 935.

PART 2- PRODUCTS

2.01 MATERIALS

A. Steel Sections: ASTM A 36.

B. Steel Tubing: ASTM A 500, Grade B.


D. Welding Materials: AWS D1.1; type required for materials being welded.

E. Primer: Fed. Spec. TT-P-31, red; for shop application and field touch-up.


2.02 FABRICATION

A. Verify dimensions on site prior to shop fabrication.
B. Fabricate items with joints tightly fitted and secured.

C. Fit and shop assemble in largest practical sections, for delivery to site.

D. Grind exposed welds flush and smooth with adjacent finished surface. Ease exposed edges to small uniform radius.

E. Exposed Mechanical Fastenings: Flush countersunk screws or bolts; unobtrusively located; consistent with design of structure, except where specifically noted otherwise.

F. Make exposed joints butt tight, flush, and hairline.

G. Supply components required for anchorage of metal fabrications. Fabricate anchorage and related components of same material and finish as metal fabrication, except where specifically noted otherwise.

2.03 ITEMS TO BE FABRICATED

A. Gates: Gates shall be constructed from the structural shapes and sizes indicated on the drawings. All welds shall be continuous; tack welding will not be permitted. Grind all welds smooth.

   1. Electrically Controlled Gate: Provide sliding gates to the size and shape indicated. Provide gate with an automatic gate opener in accordance with Section 02832.

B. Fence and Railings: Railings shall be constructed from the structural shapes and sizes indicated on the drawings. All welds shall be continuous; tack welding will not be permitted. Grind all welds smooth.

C. Steel Bollards: "Extra Strong Weight" steel pipe, size as indicated. Anchor posts in concrete as indicated and fill solidly with concrete having a minimum compressive strength of 2500 psi.

D. Desk Brackets: Brackets shall be constructed from the structural shapes and sizes indicated on the drawings. All welds shall be continuous unless indicated otherwise. Grind all welds smooth.

2.04 GALVANIZING

A. All items noted on drawings and parts embedded in concrete, or in contact with concrete shall be galvanized by the hot-dip process, conforming to ASTM A123-68a. All required hot-dip galvanizing shall be done after fabrication in the largest sections possible. Items too large for available dip tanks shall be sprayed by approved methods, with molten zinc to coating thickness of .003” to .004”.

B. Weight of the zinc coating per square foot of actual surface area shall average not less than 2.0 ounces, and no individual specimen shall show less than 1.8 ounces.

C. All shop galvanized metal work necessitating field welding which in any manner removes the original galvanizing shall be restored by field cold galvanizing with “Galvaloy”, “Galvicon”, “Drygalv” or equal.

2.05 FINISH
A. Clean surfaces of rust, scale, grease, and foreign matter prior to finishing.

B. Do not prime surfaces in direct contact bond with concrete or where field welding is required.

C. Prime paint items scheduled with one coat; except, apply two coats to surfaces inaccessible after assembly or erection.

D. Galvanize items to minimum 1.25 oz/sq ft zinc coating in accordance with ASTM A386.

E. Provide zinc-coated or cadmium plated fasteners for exterior use and where built into exterior walls.

F. Field painting shall be in accordance with Section 09900, Painting.

PART 3 - EXECUTION

3.01 PREPARATION

A. Obtain Architect approval prior to site cutting or making adjustments not scheduled.

B. Clean and strip site primed steel items to bare metal where site welding is scheduled.

C. Make provision for erection loads with temporary bracing. Keep work in alignment.

D. Supply items required to be cast into concrete or embedded in masonry with setting templates, to appropriate sections.

3.02 INSTALLATION

A. Install items plumb and level, accurately fitted, free from distortion or defects.

B. All welding shall be by certified welders. All welding shall be done in shop to the greatest extent possible. Perform welding in accordance with AWS D1.1.

C. Wall Supported Items: Attach all wall supported items by use of expansion anchors in concrete or masonry walls, and by lag bolting to adequate blocking installed in wood stud walls.

C. After installation, touch-up field welds, scratched or damaged surfaces with primer.

END OF SECTION
SECTION 06100
ROUGH CARPENTRY

PART 1 - GENERAL

1.01 QUALITY ASSURANCE

A. Regulatory Requirements: Comply with applicable provisions of the following codes and standards, unless modified by the specifications or drawings.


1.02 SUBMITTALS

A. Submit manufacturer's Data for all items to be used under this section of work.

1. Framing Connectors and Supports: Submit manufacturer's literature indicating compliance with plans and code requirements.

B. Submit manufacturer's Certification that wood materials meet the requirements specified.

1. Treated Wood: Pressure preservative treatment: Provide plant certification of compliance with specified standards and stating process employed and preservative retention values.


PART 2 - PRODUCTS

2.01 GRADE STAMPS

A. Framing lumber: Identify all framing lumber by the grade stamp of the West Coast Lumber Inspection Bureau.

B. Plywood: Identify all plywood as to species, grade, and glue type by the stamp of the American Plywood Association.

C. Other: Identify all other materials of this Section by the appropriate stamp of the agency listed in the reference standards, or by such other means as are approved by the Architect.

2.02 GENERAL REQUIREMENTS

A. Moisture content at time of placing:

1. Untreated lumber shall not exceed 19%.

2. Treated lumber shall not exceed 19%, kiln dry after pressure treatment.

3. Exposed Lumber shall not exceed 15%, kiln dried.

4. Exposed Timbers shall not exceed 19%, kiln dried. Timber is considered as material having a nominal dimension of 4 inches or greater in the smallest dimension.
5. Plywood shall not exceed 15%.

B. Sizing and surfacing: Mill size. All exposed surfaces of wood members shall be surfaced smooth except as indicated otherwise.

C. Pressure preservative treatment: AWPA Standards, using chromated zinc chloride or Wolman Salt (Tanalith). Touch-up parts made raw by curing or drilling.

D. Brush-On Preservative Treatment shall be "Woodtox", "Woodlife" or an approved equal.

E. Seal Coat: Where specified, and at cut ends and concealed faces apply a heavy saturation coat of penetrating sealer, except for treated wood, where treatment has included a water repellent.

2.03 LUMBER

A. See drawings for grades for specific uses and locations.

2.04 PLYWOOD

A. Structural plywood, U.S. Product Standard PS-1 per Structural Wood Notes.

1. OSB Board is an acceptable alternative provided it is APA rated and stamped with an APA rating.

B. All plywood shall be grade-marked by the American Plywood Association (APA). Remove all sheets not grade marked.

C. Plywood used for structural purposes shall have exterior glue.

2.05 BUILDING PAPER

A. Underlayment:

1. Base Layer: Tyvek StuccoWrap, as manufactured by Dupont, or equal.

2. Outer Layer: Weather Resistant (Breathing): Type 1, Grade D (60 minute) Building Paper

2.06 WATERPROOF MEMBRANE

A. Sheet Waterproofing: Jiffy Seal 140/60, by Protecto Wrap Co., Bituthene 3000, by W. R. Grace Company, or equal.

2.07 ROUGH HARDWARE

A. Furnish all items of rough hardware, connections, bolts, etc., required to complete the work. Bolts, nuts, and washers where exposed to elements shall be hot-dipped galvanized, conforming to ASTM A 153.


2. Bolts: Standard mild steel, square or hexagonal head machine bolts with matching nuts and cut washers, or carriage bolts with square nuts and cut washers as indicated.
3. Lag Bolts and Screws: Conform to Fed. Spec. FF-B-561B, of sizes shown or noted on drawings.

4. Toggle Bolts: Galvanized conforming to Fed. Spec. FF-B-588B(2), of sizes shown or noted on drawings.

5. Concrete and Masonry Anchors: Where anchors are not included in the concrete or masonry construction, anchors shall be galvanized machine screws or bolts with standard expansion-shield type concrete anchors, "Wej-It" Concrete Anchors as manufactured by Wej-It Expansion Products, Inc., Ramset Fasteners' "Dynabolt", McCullock Industries, "Kwik-Bolt", or approved equal, of the size and types noted on drawings or as required. Do not use expansion bolts or anchors where other type anchors are shown or noted on the drawings.

6. Powder-Driven Fasteners: "Drive-It" system of the Power Tool Corporation, "Ramset" system of Ramset Fasteners, Inc., the equivalent system of Remington-Dupont, or approved equal. Use washers with all fasteners. Powder-driven fasteners shall not be used except where first approved by the Architect in writing.

7. Framing Anchors: Simpson Co. Strong-tie connectors or approved equal, galvanized framing connectors and joist hangers as detailed, not less than 16 gage before galvanizing, having minimum design and load capacity given on the drawings, with manufacturer supplied nails.

PART 3 - EXECUTION

3.01 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 unsatisfactory conditions have been corrected.

3.02 WORKMANSHIP

A. All rough carpentry shall produce joints true, tight, and well nailed, with all members assembled in accordance with the Drawings and with all pertinent codes and regulations.

1. Contractor shall be responsible for shimming, trimming and other measures as required to provide framing smooth, plumb and ready to receive finish material.

B. Selection of lumber pieces:

1. Carefully select all members. Select individual pieces so that knots and obvious defects will not interfere with placing bolts or proper nailing or making connections.

2. Cut out and discard all defects which will render a piece unable to serve its intended function. Lumber may be rejected by the Architect, whether or not it has been installed, for excessive warp, twist, bow, crook, mildew, fungus, or mold, as well as for improper cutting and fitting.

C. Shimming: Do not shim sills, joists, short studs, trimmers, headers, lintels, or other framing components, unless noted otherwise.
3.03 TREATED LUMBER
A. Use only treated lumber for all wood bucks and nailing grounds in, or in contact with, concrete.

3.04 TIMBER FRAMING
A. Prior to installation, seal ends, cut edges and concealed faces using seal coat as specified.
B. Install beams and girders with crown edge up, minimum 4 inch bearing.
C. Wood Posts shall be secured to supporting and supported members by approved anchoring devices as indicated.

3.05 INSTALLATION OF PLYWOOD SHEATHING
A. Placement:
   1. Place all plywood with face grain perpendicular to supports and continuously over at least two supports, except where otherwise specifically indicated on the Drawings.
   2. Center joints accurately over supports. Unless otherwise specifically shown on the Drawings, stagger the end joints of plywood panels to achieve a minimum of continuity of joints.
   3. Leave 1/8 inch spacing between adjacent plywood sheathing at edge joints and 1/16 spacing at end joints.
B. Protection of Plywood: Protect all plywood from moisture by use of all required waterproof coverings until the plywood has in turn been covered with the next succeeding component or finish.

3.06 WOOD FURRING
A. Install wood furring as indicated and required for installation of finished surfaces.

3.07 FASTENING
A. Nailing:
   1. Use only common wire nails or spikes of the dimension shown on the Nailing Schedule, except where otherwise called for on the Drawings.
   2. For conditions not covered in the Nailing Schedule, provide penetration into the piece receiving the point of not less than 1/2 the length of the nail or spike provided, however, that 16d nails may be used to connect two pieces of two inch nominal thickness.
   3. Do all nailing without splitting wood. Pre-bore as required. Replace all split members. Shear wall plates and studs shall be sized in accordance with local code requirements to prevent splitting, regardless of whether or not those sizes are explicitly shown in details and schedules.
B. Bolting: Drill holes 1/16 inch larger in diameter than the bolts being used. Drill straight and true from one side only. Bolt threads shall not bear on wood. Use washers under head and nut where both bear on wood; use washers under all nuts.

C. Screws: For lag screws and wood screws, pre-bore holes same diameter as root of thread; enlarge holes to shank diameter for length of shank. Screw, do not drive, all lag screws and wood screws.

D. Where powder-driven anchors are approved for use, plates anchored to concrete floor shall be attached with pins not over 32 inches on center. All vertical furring shall be attached to concrete with pins not over 4 feet on center. Each pin shall penetrate to a minimum of 1-1/2 inch. Use washers with all pins. There shall be a minimum of 2 anchors for each member.

3.08 BACKING
A. Provide all blocking and backing required for fixtures, wall stops, toilet accessories, signage and other conditions requiring backing.

3.09 CLEANING UP
A. Keep the premises in neat, safe, and orderly condition at all times during execution of this portion of the Work, free from accumulation of sawdust, cut ends, and debris.

END OF SECTION
SECTION 06181
PARALLAM (PSL) MEMBERS

PART 1 - GENERAL

1.01 QUALITY ASSURANCE

A. Regulatory Requirements: Comply with the applicable provisions of the following codes and standards, unless modified by the specifications or drawings.


1.02 SUBMITTALS

A. Comply with pertinent provisions of Section 01300.

B. Shop Drawings: Shop Drawings shall be complete in all respects and shall indicate: Sizes, lumber species and grade, laminations, quantity, camber, combination number, location in the building of each member, type and location of connections, method of anchorage, details of erection, type of finish, appearance, grade, adhesive type, and method of protection.

C. Identification: All structural composite lumber (SCL) products shall have a stamp bearing the Manufacturer’s name and the name of the inspection agency (PFS Corporation or Intertek Testing Services), as applicable and the ICBO evaluation report number.

PART 2 - PRODUCTS

2.01 MATERIALS

A. Structural Parallam Wood Members: Shall be fabricated and delivered in accordance with the General Construction notes on the Drawings and the Drawing details.

1. Parallel Strand Lumber (PSL) shall be by Weyerhaeuser in accordance with ICC Report ESR-1387 or an approved Equal.
2. Parallam PSL shall made of the wood species Douglas Fir (DF) with a minimum grade of 2.0E.
3. Minimum allowable bending stress shall be $F_b = 2,900$ psi.

B. Scheduling: Coordinate the schedule for fabrication and shipping with the overall schedule for construction to ensure the availability of the glue laminated members on a timely basis. Stockpile the required members sufficiently in advance to prevent delay in erection schedule.

PART 3 - EXECUTION

3.01 INSTALLATION

A. Handling and Unloading: Unload trucks by hand or crane; do not dump or drop members. Use fabric or plastic slings, and protective blocking or padding with chains or cables. Protect from soiling, abrasions, and/or injury to shaped edges and/or sharp corners.

B. Field Cuts: If member was initially coated, coat exposed surfaces with an approved moisture seal.
C. Erection: Determine the weights and balance points of the timbers before lifting, and utilize proper equipment and methods. Provide stiffening beams as required.

D. Bracing: Provide erection bracing as required. The Contractor is solely responsible for the stability of the structure until construction is complete. Remove temporary bracing only after all roofing and permanent bracing are installed.

END OF SECTION
SECTION 06200
FINISH CARPENTRY

PART 1 - GENERAL

1.01 QUALITY ASSURANCE

A. Comply with the "Manual of Millwork" of the Woodwork Institute (WI) for the grades specified.

B. Before delivery to the jobsite, the millwork supplier shall issue a WI Certified Compliance Certificate indicating the grade of millwork he will furnish for this job, and certifying that they will fully meet all requirements of the grade specified.

C. All millwork and the installation thereof for this project shall be monitored for compliance to the contract documents by staff of the Woodwork Institute under the scope of their Monitored Compliance Program.

1. Full particulars of the Monitored Compliance Program's policies and procedures may be found within Section 2 of the "Manual of Millwork", on the website at www.woodworkinstitute.com or by calling the administrative office at 916-372-9943.

2. The MCP registration number is ________________ and shall be referenced in all communication.

3. Fees charged by the Woodwork Institute for their Monitored Compliance service are the responsibility of the millwork fabricator and/or installer to include with their bid.

4. Millwork and/or installation determined to be non-compliant (and not corrected) will be rejected.

5. Issuance of the Monitored Compliance Certificate is a prerequisite of the owner's final acceptance.

1.02 SUBMITTALS

A. Submit shop drawings showing each of the items to be provided under this section. Shop drawings shall be to scale and shall indicate the material grade and species, full size profiles of moldings, thicknesses, size of parts, construction, fastening, blocking, clearances, assembly and erection details, applied finishes and surfacing, mill applied and/or built-in hardware, and necessary connections to work of other trades.

1. Submit Product Data for all hardware items. Include list of all hardware. When requested, provide hardware samples.

B. Submit samples of plastic laminate, solid surface material and bamboo (with specified finish).

1. Submit samples of coved edge, no-drip edge and front radius edge details for approval.

1.03 PRODUCT DELIVERY, STORAGE AND HANDLING

A. Materials shall be delivered to the site in undamaged condition, stored in fully covered, well ventilated areas, and protected from extreme changes in temperature and humidity as
recommended by WI Technical Bulletin 419-R - "Recommended Care and Storage of Architectural Millwork".

1.04 WARRANTY

A. Provide manufacturer's warranty against defects in materials, fabrication and installation, excluding damages caused by physical or chemical abuse or excessive heat. Warranty shall provide for replacement or repair of material and labor for a period of ten years, beginning at Date of Substantial Completion.

PART 2 - PRODUCTS

2.01 GRADES


1. Construction Style: Style A Frameless (Style B at Bunk Room lockers).

2. Construction Type: Type I Multiple self supporting units rigidly joined together or Type II Single length sections to fit access openings.

3. Materials:
   c. Liner at Personnel Locker: "Cedar Classic" 1/4" panel on interior back side of locker.
   d. Door and Drawer Front Style: Flush overlay. Personnel Locker doors shall be 1" minimum thickness.
   e. All cabinet doors and drawer fronts to be WIC Type V, solid banding, with radiused edges.
   f. Adjustable shelves shall be in accordance with WIC requirements, subject to a 40 pound per square foot spaced load, not to exceed 200 pounds total per shelf. Finish all edges of shelves.


2. Construction Type: Type I Multiple self supporting units rigidly joined together or Type II Single length sections to fit access openings.

3. Materials:
b. Semi-Exposed Materials: High pressure laminate cabinet liner (Melamine), color shall be white.

c. Door and Drawer Front Style: Full Flush Overlay.

d. All cabinet doors and drawer fronts to be WI Type A.

e. Upper Cabinets: Where noted, provide a 2 inch lip on upper cabinets with undercabinet light fixtures.

f. Provide rubber bumpers on inside corners of all doors and drawers to prevent laminate to laminate contact.

g. Adjustable shelves shall be in accordance with WI requirements, subject to a 40 pound per square foot spaced load, not to exceed 200 pounds total per shelf. Finish all edges of shelves. Finish as indicated for semi-exposed surfaces.

C. Solid Surface Countertops: Countertops shall be homogeneous filled polymer material as indicated. Thickness shall be 1/2 inch minimum. Furnish and install complete with apron, back and end splashes and cutouts for all plumbing fixtures. Edges shall be 1/4” radius, double thickness at edges with color lamination core to match colors as selected.

1. Material: Cast, filled, acrylic; not coated, laminated or of composite construction, meeting ANSI Z124, Type Six, and FS WW-P-541E/GEN.

   a. Superficial damage to a depth of 1/32 inch shall be repairable by sanding or polishing.

2. Joint Adhesive: Manufacturer’s standard two-part adhesive kit to create inconspicuous, non-porous joints by chemical bond. Joints shall be inconspicuous in appearance and without voids. Reinforce joints with strip of solid polymer material, 2” wide.

   a. Where joints are required verify joint location with Architect prior to fabrication.

3. Cove Backsplash: Fabricate backsplashes using 1/2 inch solid polymer material. Create 1/2 inch radius cove at intersection of counters and backsplashes.

4. Front Edge: At lavatories and other counters provide a waterfall front edge.

5. Sealant: Manufacturer’s standard mildew-resistant, FDA, UL listed silicone sealant in colors matching components.

6. Fabrication: Factory fabricate components to greatest extent practical to sizes and shapes indicated, in accordance with approved shop drawings and manufacturer’s printed Instructions and technical bulletins.

   a. Provide factory cutouts for plumbing fittings and bath accessories as indicated on the Drawings.

   b. Rout and finish component edges with clean, sharp returns. Rout cutouts, radii and contours to template. Smooth edges. Architect shall reject defective and inaccurate work.

   c. Finish: Provide surfaces with a uniform matte finish (Gloss range of 5-20).

7. Subtops: Provide solid plywood subtops beneath solid surface tops.
D. Stainless Steel Countertops: Type 316, 14 gauge stainless steel countertop with integral backsplash as indicated. Fabricate in shop to greatest extent possible to sizes and shapes indicated.

1. Where joints are required verify joint location with Architect prior to fabrication (must show in shop drawings).

2. Splash shall be coved, as indicated on drawings. Provide end splashes with square butt joints.
   a. Edge shall extend beyond face of doors/drawers in the closed position and return back to subtop.


E. Sheet Metal Countertops: 16 gauge sheet metal countertop with integral backsplash as indicated. Fabricate in shop to greatest extent possible to sizes and shapes indicated.

1. Where joints are required verify joint location with Architect prior to fabrication (must show in shop drawings).

2. Splash shall be coved, as indicated on drawings. Provide end splashes with square butt joints.
   a. Edge shall extend beyond face of doors/drawers in the closed position and return back to subtop.

2. Subtops: Provide solid plywood subtops beneath stainless steel countertops.

2.02 ACCESSORIES

A. Provide fasteners properly selected for the material to be fastened and the substrate to which the material will be fixed, designed to develop proper and adequate strength commensurate with the use.

2.03 HARDWARE

A. Provide all finish hardware for all casework included in work of this section:

1. Unless otherwise specified, all hardware shall be US32D, Satin Stainless Steel.

2. Hinges: European style, all metal concealed self-closing hinges having passed a 100,000 cycle test. Blum-Modul Series 90 with 170 degree opening, or equal. Hinges shall have a lifetime warranty as offered by the manufacturer. Provide two hinges per door under 36" high, three hinges per door over 36" high.

3. Magnetic Catches: National No. 61-570, or equal.

4. Drawer and Door Pulls: Iron Munger 96mm (wire pulls), or equal.

5. Drawer Guides: Full extension, 100 pound load capacity, KV8407 or equal, metal, epoxy coated with nylon rollers.

6. Adjustable Shelf Standards: Zinc coated steel, KV 255, Grant 120, or equal.
7. Adjustable Shelf Clips: Zinc coated steel, KV 239, Grant 21, or equal 12.

8. Storage Room Shelf standards and brackets:
   a. 14" shelving: KV 83 standards and KV183 Brackets. Provide standards at 16 inch centers and brackets to provide (6) 14 inch wide wide (as indicated) shelves in each Storage Room and as indicated.

9. Plastic Grommets: Provide 2" plastic grommets, color as selected by Architect, one per desk area, or as indicated. Locate as directed by Architect.

10. Personnel Locker:
    a. Roller Catch: KV K901 Bullet Catch, or equal, satin stainless steel finish.
    b. Clothes Hanger Rod: Bobrick B207, cut to fit.
    c. Towel Bar: Bobrick B6747, 18 inches, or equal.
    d. Hinges: Continuous stainless steel heavy duty piano hinge.
    e. Mirror: Provide mirrored glass with beveled edge, size as indicated.

2.04 MISCELLANEOUS MATERIAL
A. Wood trim: Trim shall be birch, solid stock, rift cut, sized as indicated and required.

PART 3 - EXECUTION

3.01 COORDINATION
A. Coordinate installation of bucks, anchors, blocking, electrical, plumbing and mechanical work which is to be placed in or behind casework.
   1. Contractor shall be responsible for inspection and acceptance of the wall and ceiling framing. Contractor shall verify that all framing is straight, plumb, and level, and ready for installation of casework. Commencement of casework installation indicates acceptance of existing conditions.

3.02 CONSTRUCTION

B. Solid Surface Countertops: Install components plumb, level and rigid, scribed to adjacent finishes, in accordance with approved shop drawings and product data. Form field joints using manufacturer's recommended adhesive, with joints inconspicuous in finished work. Reinforce joints as required. Adhere sinks and lavatory bowls to tops using manufacturer's recommended sealant, adhesive and mounting hardware. Provide backsplashes and sidesplashes as indicated on the Drawings. Adhere to tops using manufacturer's standard color matched silicone sealant.
   1. Keep components clean during installation. Remove adhesives, sealants and other stains. Keep clean until Date of Substantial Completion. Replace stained and damaged components.
C. Stainless Steel and Sheet Metal Countertops: Install components plumb, level and rigid, scribed to adjacent finishes, in accordance with approved shop drawings and product data. Weld all joints and grind smooth, with joints inconspicuous in finished work. Reinforce joints as required.

1. Keep components clean during installation. Remove adhesives, sealants and other stains. Keep clean until Date of Substantial Completion. Replace stained and damaged components.

D. Plastic Laminate Countertops: Laminated plastic shall be securely glued to the core with Type II adhesive applied as recommended by the manufacturer. The adhesive shall meet the Heat Resistant Test Requirements set forth in the WIC Glossary. All joints shall be tight and leakproof. All exposed joints shall be finishes with manufacturer’s recommended color-matched sealants.

3.03 INSTALLATION

A. Install work in this section as specified in WI "Manual of Millwork,“.

B. Install all components plumb and level, in accordance with approved Shop Drawings and manufacturer’s product installation guidelines.

C. Make plumbing connections to sinks in accordance with Division 15, Mechanical.

3.04 FINISHING

A. Finish all casework and related trim as specified in WI "Manual of Millwork," Section 5 for shop finishing, Custom Grade. Field finishing of casework will not be permitted.

3.05 ADJUSTMENT, CLEANING FINISHING AND PROTECTION

A. Repair damaged and defective casework wherever possible to eliminate defects functionally and visually; where not possible to repair properly, replace casework. Adjust joinery for uniform appearance.

B. Clean casework on exposed and semi-exposed surfaces. Touch-up shop-applied finishes to restore damaged or soiled areas.

END OF SECTION
SECTION 06612
FIBERGLASS REINFORCED PLASTIC FABRICATIONS

PART 1 GENERAL

1.1 SECTION INCLUDES
A. Glass fiber reinforced polyester fabrications as indicated on the Drawings and as follows:
   1. Door and Window Surrounds
   2. Ornamental Shapes

1.2 RELATED SECTIONS
A. Section 05500 - Metal Fabrications: Supplementary supports for large items.
B. Section 06100 - Rough Carpentry: Supplementary supports for large items.
C. Section 09900 - Painting: Field painting and sealing prior to painting.

1.3 REFERENCES

1.4 SUBMITTALS
A. Submit under provisions of Section 01300.
B. Product Data: Manufacturer's data including:
   1. Preparation instructions and recommendations.
   2. Storage and handling requirements and recommendations.
   3. Installation methods.
C. Shop Drawings: For fabrication, provide drawings showing dimensions, layout, joints, attachment methods, reinforcing, details, and interface with adjacent work; include field measured dimensions of the spaces where items are to be installed, if critical to proper installation.
D. Selection Samples: For each finish product specified, two complete sets of color chips representing manufacturer's full range of available colors and finishes.
E. Verification Samples: For each finish product specified, two samples, minimum size 6 inches (150 mm) square, representing actual product, color, and finish.

1.5 QUALITY ASSURANCE
A. Manufacturer Qualifications: Company specializing in manufacturing products specified in this section with minimum ten years documented experience.
B. Installer Qualifications: Company specializing in performing Work of this section with minimum three years documented experience.

C. Mock-Up: Provide a mock-up for evaluation of fabrications, finishes and workmanship.
   1. Upon approval by the Architect of the shop drawings, inspection of the tooling shall be approved by the architect on site or at the facility of the Fiberglass manufacturer prior to beginning of parts fabrication.
   2. Patterns and mock-ups shall be fabricated by skilled craftsmen who have a minimum of five years experience in manufacturing of Architectural components and/or related design projects.
   3. Molds shall be constructed of from seven to nine layers of glass fibers with tooling resin and gel coat and/or rubber molds shall be fabricated by skilled craftsmen with a minimum of five years experience in manufacturing of architectural components for similar projects.

1.6 MANUFACTURER QUALIFICATIONS:
   A. The Fiberglass Manufacturer shall be one who is currently in the business of manufacturing and supplying architectural Fiberglass components for the building construction industry and can demonstrate this capability.

1.6 DELIVERY, STORAGE, AND HANDLING
   A. Transport, lift, and handle units with care, avoiding excessive stress and preventing damage; use appropriate equipment.
   B. Store products in manufacturer’s unopened packaging until ready for installation, in a clean dry area off the ground and protected from weather, moisture and damage; store units upright and not stacked unless permitted by manufacturer.
   C. Store and dispose of solvent-based materials, and materials used with solvent-based materials, in accordance with requirements of local authorities having jurisdiction.

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 manufacturer’s absolute limits.

1.8 GENERAL REQUIREMENTS
   A. Field Conditions: Verify drawings dimension with actual field conditions. Inspect related work and adjacent surfaces. Report to Architect any conditions which prevent proper execution of this work. Assume full responsibility of fitting the components to the building.
   B. The components indicated on the drawings show dimensions established to accomplish the Architect’s intended visual result and to conform to the buildings configuration. The contractor shall verify that the components that will be actually provided for the work of this section will fit the building=s structural elements and conform to visual criteria and profiles indicated on the drawings without materially altering profiles and alignments.
   C. Any additional support or reinforcement for the components shall be provided and installed
by the installation contractor as part of the work of this section.

D. Codes: Materials and work shall conform to the government building codes.

PART 2 PRODUCTS

2.1 MANUFACTURERS

A. Acceptable Manufacturer: Moonlight Molds, 310-538-9142, or equal.

2.2 MATERIALS

A. Fiberglass-reinforced polyester components shall be manufactured using the specified resins, and reinforced chopped glass fibers. All exposed surfaces shall be finished with custom colored gel-coat. Materials shall be as follows:

1. Glass cloth, matt and Chop: Equal to the products of PPG-Owens Corning.
2. Polyester resins shall be General Purpose, promoted thixotropic polyester resin designed for use in hand lay-up and spray-up processed. This resin is for use in applications that do not require an ASTM E-84 flame spread rating.

B. Hardware and Fasteners: Provide all metal hardware and fasteners, both loose and embedded. Hardware and fasteners shall be stainless steel.

C. Sealants: As specified in Section 07920. Sealants must be compatible with paint specified in Section 09900.

2.3 FABRICATION

A. Fiberglass reinforced plastic components shall be manufactured using the specified resins, reinforced with the chopped glass fibers.

B. Internal reinforcement, anchorage clips, brackets, and additional glass fiber and matt shall be provided as required by the structural design.

C. Final ratio of materials, other than metal shall be 25% resin, 75% fiber for body of components.

D. Facecoat thickness shall be .015" to .025".

E. Finished panels shall be true to line in shapes indicated on the drawings.

F. Joints in components shall be matched at the factory and numbered for field installation.

G. Components shall be fabricated to eliminate exposed fasteners, whenever possible.

H. Components shall have a smooth paint grade finish.

J. Provide all special transition, corner pieces (inside and outside) and special closures necessary for a complete, visually continuous, weather tight installation. All inside and outside corners shall be shop fabricated. Fabrication of corners in field will not be permitted.

K. Coordinate cutouts required for electrical outlets, lights and other penetrations as required. Reinforce as required and provide special formed closures to make joints and intersection
weather tight.

L. Finished components shall be true to line in the shapes indicated on the drawings, free of warps, twists, waves or distortion.

PART 3 EXECUTION

3.1 DELIVERY, STORAGE AND HANDLING:

A. Transport and handle units in a manner that avoids excessive stresses or damage.

B. Store the units level on a clean and dry surface in an area protected from weather and damage, preferably in an upright position.

C. Do not unpack crates until immediately prior to installation.

D. Handle materials to prevent damage to finished surfaces.

3.2 EXAMINATION

A. Do not begin installation until substrates have been properly prepared. Verify that water-tight substrates exist prior to installation of work under this section.

B. If substrate preparation is the responsibility of another installer, notify Architect of unsatisfactory preparation before proceeding.

C. Check field dimensions before beginning installation. If dimensions vary too much from design dimensions for proper installation, notify Architect and wait for instructions before beginning installation.

3.3 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.

C. Install supplementary temporary and permanent supports as required for proper installation.
   1. Coordinate required blocking for attachment of FRP components to substructure. Provide additional, wood stud framing as may be required to attached and reinforce panels for a solid installation.
   2. Coordinate installation with any metal gutter lining work or flashing above and wood/metal substrates.

3.4 INSTALLATION
A. Install in accordance with applicable code and manufacturer’s recommendations, plumb and true to line; shim where necessary. Follow fiberglass panel manufacturer’s recommendations for installation clearances, notches, and formation of panel-to-panel joints.

B. Install with variation from position shown on drawings not more than 1/4 inch in 10 feet; align horizontal and vertical joints.

C. Fasten using methods that allow for thermal expansion and contraction.

D. Provide control joints at not more than 35 feet on center if not indicated on drawings.

E. Provide expansion joints where moving joints in substrate occur.

F. Do not cut or abrade finishes, which cannot be completely restored in the field. Small inconspicuous finish repairs may be done in the field using manufactures color matching gel fill finish. Large repairs shall be returned to fiberglass manufacturer for alterations or new units.

G. Countersink all exposed fasteners. Patch all attachment holes with gel fill finish supplied by the fiberglass panel manufacturer for field application. Finish attachment points so that there is no detectable difference in the completed panel surface.

H. Install sealant and accessories as work progresses, so as to make the work weather tight.

3.5 PROTECTION

A. Protect installed products until completion of project.

B. Touch-up, repair or replace damaged products before Substantial Completion.

3.6 FINISHING

A. Finish painting shall be in accordance with Section 09900, Painting.

3.7 CLEANING

A. Clean fabrication components of foreign material without damaging finished surface.

B. If required, hand rub smooth surfaces with polishing cream.

END OF SECTION
SECTION 07115
SHEET OR LIQUID APPLIED WATERPROOFING

PART 1 - GENERAL

1.01 QUALITY ASSURANCE

A. Manufacturer: Obtain primary waterproofing materials of each type required from a single manufacturer, to greatest extent possible. Provide secondary materials only as recommended by manufacturer of primary materials.

B. Installer: Firm with not less than 3 years of successful experience in installation of waterproofing sheets similar to requirements for this project and which is acceptable to or licensed by manufacturer of primary waterproofing materials.

1. As applicable, assign work closely associated with waterproofing, including (but not limited to) metal flashing and counterflashing, expansion joints, and joint sealers, to installer of sheet waterproofing, for individual responsibility.

1.02 SUBMITTALS

A. Product Data: Submit specifications, installation instructions, and general recommendations from waterproofing materials manufacturer, for types of waterproofing required. Include data substantiating that materials comply with requirements.

C. Qualifications: Submit installer qualifications, lists of similar projects, and manufacturer's approval of material installer.

1.03 JOB CONDITIONS

A. Substrate: Proceed with work of this section only after substrate construction, openings, and penetrating work have been completed.

B. Weather: Proceed with waterproofing and associated work only when existing and forecasted weather conditions will permit work to be performed in accordance with manufacturers' recommendations and warranty requirements.

1.04 SPECIAL PROJECT WARRANTY

A. Provide written warranty, signed by Contractor, Installer, and Manufacturer of primary waterproofing materials, agreeing to replace/repair defective materials and workmanship, including significant leakage of water, abnormal aging or deterioration of materials, and other failures of waterproofing to perform as required within warranty period.

1. Warranty period is 5 years after date of substantial completion.

1.05 WORK SPECIFIED ELSEWHERE

A. Reference Section 02725.
PART 2 - PRODUCTS

2.01 MATERIALS

A. Sheet Waterproofing: Jiffy Seal 140/60, by Protecto Wrap Co., Bituthene 3000, by W. R. Grace Company, or equal.

B. Liquid Applied Waterproofing: Tremproof 250GC, or equal.

C. Protection Course: Prefabricated drainage boards as specified in Section 02725, "Subdrainage Systems".

PART 3 - EXECUTION

3.01 INSPECTION

A. Installer must examine substrate and conditions under which waterproofing work is to be performed and must notify Contractor in writing of unsatisfactory conditions. Do not proceed until unsatisfactory conditions have been corrected in manner acceptable to Installer.

3.02 PREPARATION

A. Prior to installation of waterproofing and associated work, meet at project site with Installer of each component of associated work, and installers of work requiring coordination with waterproofing work, for purpose of reviewing material selections and procedures to be followed in performing work.

3.03 INSTALLATION

A. Comply with manufacturer's instructions for handling and installation of sheet applied waterproofing materials, except where more stringent requirements are shown or specified.

B. Coordinate installation of waterproofing materials and associated work to provide complete system complying with combined recommendations of manufacturers and installers involved in work. Schedule installation to minimize period of exposure of waterproofing materials.

C. Extend waterproofing as shown to provide complete membrane over area indicated to be waterproofed. Seal to projections through membrane and seal seams. Bond to vertical surfaces and also, where shown or recommended by manufacturer, bond to horizontal surfaces.

D. Install protection course of type indicated over completed membrane, complying with manufacturer's recommendations for both waterproofing sheet and protection course materials.

3.04 PERFORMANCE REQUIREMENTS

A. It is required that waterproof membranes be watertight and not deteriorate in excess of limitations published by manufacturer.
3.05 PROTECTION

A. Institute all required procedures for protection of completed membrane during installation of work over membrane, from exposure by ultra violet rays, and throughout remainder of construction period. Do not allow traffic of any type on unprotected membrane.

B. Secure protection board at exposed grade area. Do not permit dirt or other materials to come in contact with waterproof membrane.

END OF SECTION
SECTION 07200
BUILDING INSULATION

PART 1 - GENERAL

1.01 QUALITY ASSURANCE

A. Thermal Conductivity: Where insulation is identified by "R" value, provide thickness required to achieve indicated value.

1.02 SUBMITTALS

A. Submit manufacturer's product specifications and installations instructions for each type of insulation.

1.03 PRODUCT HANDLING

A. Protect insulation from physical damage and from becoming wet or soiled. Comply with manufacturer's recommendations for handling, storage and protection during installation.

PART 2 - PRODUCTS

2.01 BATT INSULATION

A. Insulation materials shall be fiberglass batts or blankets of the types and R-values specified for the various applications as manufactured by Owens-Corning Fiberglas Corp., or equal.

1. Roof Insulation: R-30 kraft faced batts.
   a. Heat content of facing and substrate shall be less than 1,000 BTU/SF.
   b. Insulation materials shall have a flame spread rating of less than 75 and a smoke developed rating of less than 150.

2. Exterior Wall Insulation: R-19 kraft faced batts.
   a. Insulation materials shall have a flame spread rating of less than 75 and a smoke developed rating of less than 150.

4. Sound Insulation in Interior Walls and Ceilings: Unfaced batts designed for friction fit thickness to match wall cavity thickness.
   a. Insulation materials shall have a flame spread rating of less than 75 and a smoke developed rating of less than 150.

PART 3 - EXECUTION

3.01 INSPECTION

A. Examine the areas and conditions under which work of this Section will be installed. Correct conditions detrimental to proper and timely completion of the Work. Do not proceed until
unsatisfactory conditions have been corrected in a manner acceptable to installer.

3.02 INSTALLATION

A. Do not install insulation until such a time as the construction has progressed to the point that inclement weather will not damage or wet the insulation material.

B. Comply with manufacturer’s instructions for particular conditions of installation in each case. If printed instructions are not available or do not apply to project conditions, consult manufacturer’s technical representative for specific recommendations before proceeding with work.

C. Extend insulation full thickness as shown over entire area to be insulated. Cut and fit tightly around obstructions, and fill voids with insulation. Fully insulate all small areas between closely spaced framing members. Remove products which interfere with placement. Install full height of the wall or between joists.

D. Apply a single layer of insulation of required thickness, unless otherwise shown or required to make up total thickness. Insulation shall be continuous behind all light switches, convenience outlets, etc.

E. Cut and fill insulation materials around pipes, conduits, etc., as necessary to maintain the integrity of the insulation. Where pipes are installed in spaces to receive insulation, place insulation between exterior wall and the pipe, compressing insulation if necessary.

F. Install batt insulation between framing with flanges continuously tight against framing members, using staples or nails.

G. Install insulation between framing for friction fit where enclosed between two hard surfaces. Install with wire support where enclosed on one side only.

END OF SECTION
SECTION 07270

FIRESTOPPING

PART 1 - GENERAL

1.01 QUALITY ASSURANCE

A. Qualifications of Installers: Proper installation of firestopping require that installers be thoroughly trained and experienced in the necessary skills and thoroughly familiar with the specified requirements.

1.02 SUBMITTALS

A. Comply with pertinent provisions of Section 01300.

B. Submit the following:
   1. Manufacturer’s Data: Manufacturer’s data for fire-stopping including firestopping composition, performance characteristics, and installation procedures.
   2. Certification that materials conform to the requirements specified.
   3. UL approvals for each application and condition.

1.03 PRODUCT DELIVERY, STORAGE AND HANDLING

A. Deliver to the job site in unopened containers or cartons bearing manufacturer’s names, brand designations and product descriptions. Store products under cover and protect from damage. Do not use damaged materials.

PART 2 - PRODUCTS

2.01 MATERIALS

A. Firestopping System: 3M Fire Barrier System, Dow Corning Fire Stop System, or equal.

B. Product Characteristics:
   1. All fire barrier materials shall be asbestos-free, intumescent in nature, and capable of maintaining an effective barrier against flame, smoke and gases in compliance with the requirements of ASTM E 814 and UL 1479.
   2. Materials shall be suitable for the firestopping of penetrations made by steel, glass, plastic, and insulated pipes.
   3. The rating of the firestops shall be one (1) hour minimum, but in no case less than the rating of the time-rated floor or wall assembly.
PART 3 - EXECUTION

3.01 INSTALLATION

A. Surface Preparation: Surfaces to be in contact with firestopping materials shall be free of dirt, grease, oil, loose material, rust, or other substances that may affect proper fitting or the required fire resistance.

B. Firestopping System:

1. In general, use foam for complex fire-rated wall and floor penetrations, including multiple cables, multiple conduits and pipes, and mixtures of cables, conduits, and pipes.

2. In general, use sealant for simple fire-rated wall and floor penetrations, including plumbing fixtures, simple cable systems, conduit or pipe through sleeves, and fire-rated expansion joints.

3. Coordination: Coordinate the work with other trades. Firestopping materials at penetrations of insulated pipes and ducts shall be applied prior to insulation, unless the insulation meets the requirements specified for firestopping.

C. Installation: Install firestopping materials in accordance with the manufacturer’s instructions.

D. Examination of Firestopped Areas: Examine firestopped areas to ensure proper installation prior to concealing or enclosing the firestopped areas.

END OF SECTION
SECTION 07325
CONCRETE ROOFING TILES

PART 1 - GENERAL

1.01 SUBMITTALS

A. Submit Shop Drawings indicating details of hip, ridge, and rake configurations. Include methods of fastening.

B. Submit manufacturer's product data.

C. Submit samples of concrete roof tiles to indicate range of color variation.

D. Prepare sample panel of tile for Architect's review. Sample panel to be 15 rows wide by minimum of 8 tile high.
   1. Use construction methods and materials specified or required indicating full range of color and texture of roofing and mortar.

E. Guarantee: Provide the Owner with a written lifetime manufacturer's guarantee against any and all defects in materials on those items furnished and installed. Provide the Owner with a written five year contractor's guarantee against any and all defects in workmanship on those items furnished and installed.

F. Certifications: Prior to commencement of construction, Contractor shall submit a letter from the manufacturer's warranty department which indicates the following:
   1. All contractor documents relating to the roof system have been reviewed and are acceptable.
   2. All materials specified are physically and chemically compatible with each other, and the system, as designed, is suitable for the specified warranty.
   3. The roof contractor is an approved applicator of the material manufacturer.
   4. The address and location of the project.

G. Applicator Qualifications: Submit certification from the roofing material manufacturer that the applicator has been approved by the manufacturer, has a minimum of five years experience installing the specified roof system, and provide a list of similar installations performed by the applicator using the specified roofing system.

1.02 DELIVERY, STORAGE AND HANDLING

A. All material shall be stored and handled in a manner which will prevent damage.

B. Material shall be stored in original containers and shall be clearly marked with manufacturer's name.
1.03 PREROOFING CONFERENCE

A. Prior to starting the application of the roofing system and insulation there will be a preroofing conference with the Architect to assure: (1) a clear understanding of the drawings and specifications; (2) on site inspection of the roofing substrate and pertinent structural details relating to the roofing system; and (3) providing the roofing system and other components secured to the roofing. The conference shall be attended by the Architect, Owner's representative, Construction Manager, Contractor, roofing materials manufacturer, roofing and insulation subcontractor, flashing and sheet metal subcontractor, mechanical subcontractor and electrical subcontractor. All conflicts shall be resolved and confirmed in writing.

PART 2 - PRODUCTS

2.01 MATERIALS

A. Roofing Tile: Regular weight concrete roof tile, by Eagle Roofing Tile, Monier Life Tile, or equal. Color shall be as indicated, with matching metal eave riser/closure strips at all eaves. Tile shall meet “Cool Roof” requirements.

B. Roofing Nails: Simplex or Stronghold with 5/16" (minimum) diameter square head and annular threaded shank of a length sufficient to penetrate sheathing 1/2".

C. Underlayment: No. 30 asphalt saturated felt.

D. Mortar Materials: As per manufacturer's recommendations.

E. Flashing: In accordance with Section 07620.

F. Miscellaneous Materials: Provide all additional materials as recommended by the manufacturer and necessary for proper installation of the specified product.

PART 3 - EXECUTION

3.01 EXAMINATION AND PREPARATION

A. Verify that deck surfaces are clean, dry, free of ridges, warps and voids.

B. Do not proceed until all unsatisfactory conditions have been corrected.

3.02 INSTALLATION

A. Underlayment: Apply two layers of No. 30 felt at right angles to roof pitch. All areas of roofing shall receive a minimum of two layers of underlayment.
   1. Horizontal laps shall be 4" with sidelaps 6" minimum.
   2. Underlayment shall be securely nailed per manufacturer’s recommendations.
   3. Turn felt up not less than 6" at vertical surfaces or as required under flashing.
   4. Apply a double layer of felt over ridges and hips by overlapping not less than 12".
5. Apply a full-width (36") strip of felt under all metal valleys. Provide at least one layer of felt under all metal work.

6. Nailing: Do not penetrate through sheathing or framing with fasteners where exposed from below. Staples or nails driven through underlayment shall be set in mastic.

B. Tile Attachment: Provide additional batten boards and framing members as required or recommended by the manufacturer for the proper installation of the roofing tiles.

D. Roofing Tiles: Lay tile at right angles to eaves, beginning at eaves at working toward ridge. Install tiles in accordance with manufacturer’s recommendations.

1. Lay field tile in straight pattern.

2. Nail every tile, starter course, ridge course and gable courses.

3. Valley Tile: Cut at 45 degrees with flashing placed as indicated.

4. Extend all pan tiles beyond facia per manufacturer's recommendations.

5. Where tile joins hips and ridges voids shall be filled with mortar.

E. Ridge, hip, and rake tile shall be used on all hips, rakes and ridges, nailed to a nailing strip and wet-bedded in cement mortar.

F. All tile in contact with mortar shall be immersed in water for three minutes before laying to assure an adequate bond with mortar.

G. To avoid color patterning, checkerboarding, spotting and stai-stepping:

1. Roof load tiles from different pallets.

2. After the installation of each 100 roofing tiles make a visual inspection from the ground level.

   a. Verify that tile courses follow straight and true lines. Verify that the color range is smooth with no abrupt changes.

3. Correct any color or installation problems before proceeding with the installation.

H. Flashing: Install in accordance with manufacturer’s recommendations and as indicated.

3.03 CLEANING UP

A. Upon completion of work of this section, and as a condition of acceptance, completely remove from the job site all tools, equipment, debris, and surplus materials pertaining to this portion of the work.

END OF SECTION
SECTION 07460

FIBER CEMENT SIDING, SOFFIT, AND TRIM

PART 1 - GENERAL

1.1 1.01 SECTION INCLUDES
   A. Factory-finished fiber cement lap siding, shingles, and panels; James Hardie HZ10 Engineered for Climate Siding or equal.
   B. Fiber cement fascia, trim, soffit, moulding and accessories; James Hardie HZ10 Engineered for Climate Siding or equal.

1.2 RELATED SECTIONS
   A. Section 06100 - Rough Carpentry.
   B. Section 07200 - Insulation.

1.3 REFERENCES
   B. ASTM E136 - Standard Test Method for Behavior of Materials in a Vertical Tube Furnace at 750 degrees C.

1.4 SUBMITTALS
   A. 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.
   B. Shop Drawings: Provide detailed drawings of atypical non-standard applications of cementitious siding materials which are outside the scope of the standard details and specifications provided by the manufacturer.
   C. Verification Samples: For each finish product specified, two samples, minimum size 4 by 6 inches, representing actual product, color, and patterns.

1.5 QUALITY ASSURANCE
   A. Installer Qualifications: Minimum of 2 years experience with installation of similar products.
   B. 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.

1.6 DELIVERY, STORAGE, AND HANDLING
   A. Store products in manufacturer's unopened packaging until ready for installation.
B. Store siding on edge or lay flat on a smooth level surface. Protect edges and corners from chipping. Store sheets under cover and keep dry prior to installing.

C. Store and dispose of solvent-based materials, and materials used with solvent-based materials, in accordance with requirements of local authorities having jurisdiction.

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 manufacturer’s absolute limits.

1.8 WARRANTY

A. Product Warranty: Limited, non-pro-rated product warranty.
   1. HardiePlank HZ10 lap siding for 30 years.
   2. HardiePanel HZ10 vertical siding for 30 years.
   3. HardieSoffit HZ10 panels for 30 years.
   4. HardieTrim HZ10 Boards for 15 years.
   5. HardieShingle for 30 years.

B. Finish Warranty: Limited product warranty against manufacturing finish defects.
   1. When used for its intended purpose, properly installed and maintained according to Hardie’s published installation instructions, James Hardie’s ColorPlus finish with ColorPlus Technology, for a period of 15 years from the date of purchase: will not peel; will not crack; and will not chip. Finish warranty includes the coverage for labor and material.

C. Workmanship Warranty: Application limited warranty for 2 years.

PART 2 PRODUCTS

2.1 MANUFACTURERS

A. Acceptable Manufacturer: James Hardie Building Products, Inc.,
   www.jameshardiecommercial.com, LP Building Products, or equal.

2.2 SIDING

A. Vertical Siding: HardiePanel HZ10 siding as manufactured by James Hardie Building Products, Inc. or equal.
   1. Type: Smooth Vertical Siding Panel 4 feet by 8 feet, with batten trim

B. Trim:
   1. HardieTrim HZ10 boards as manufactured by James Hardie Building Products, Inc. or equal.
      a. Product: 4/4 Boards width as indicated.
      b. Texture: Smooth
      c. Length: 12 feet
      d. Thickness ¾”

C. Soffit Panels: Hardie Soffit HZ10 soffit panel, factory sealed on 5 sides as manufactured by James Hardie Building Products, Inc. or equal.
1. Type: Smooth non-vented 12 inches by 12 feet.
2. Type: Smooth non-vented 16 inches by 12 feet.

2.3 FASTENERS
A. As recommended by the manufacturer for wood and metal framing.

2.4 FINISHES
A. Factory Primer: Provide factory applied universal primer.
   1. Primer: Factory primed by James Hardie
   2. Topcoat: Refer to Section 09900 and Exterior Finish Schedule.
B. Finish: Reference Section 09900.

2.5 UNDERLAYMENT
A. Base layer: Tyvek Stucco Wrap, as manufactured by Dupont, or equal.
B. Outer layer: Weather Resistant (Breathing): Type 1, Grade D (60 minute) Building Paper.

PART 3 EX

EXECUTION

3.1 EXAMINATION
A. Do not begin installation until substrates have been properly prepared.
B. If framing preparation is the responsibility of another installer, notify Architect of unsatisfactory preparation before proceeding.
C. Wood and metal framing as occurs:
   1. Install underlayment / water-resistive barriers and claddings to dry surfaces.
   2. Repair any punctures or tears in the water-resistive barrier prior to the installation of the siding.
   3. Protect siding from other trades.

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.
C. Install a water-resistive barrier is required in accordance with local building code requirements and as indicated.
D. The water-resistive barrier must be appropriately installed with penetration and junction flashing in accordance with local building code requirements.

3.3 INSTALLATION – HARDIEPANEL HZ10 VERTICAL SIDING
A. Install materials in strict accordance with manufacturer’s installation instructions.
B. Block framing between studs where HardiePanel siding horizontal joints occur.

C. Install metal Z flashing and provide a 1/4 inch gap at horizontal panel joints.

D. Place fasteners no closer than 3/8 inch from panel edges and 2 inches (51 mm) from panel corners.

E. Allow minimum vertical clearance between the edge of siding and any other material in strict accordance with the manufacturer's installation instructions.

F. Maintain clearance between siding and adjacent finished grade.

G. Specific framing and fastener requirements refer to ICC-ES Evaluation Report No. ESR-1844

H. Factory Finish Touch Up: Apply touch up paint to cut edges in accordance with manufacturer's printed instructions.  
   1. Touch-up nicks, scrapes, and nail heads in pre-finished siding using the manufacturer's touch-up kit pen.  
   2. Touch-up of nails shall be performed after application, but before plastic protection wrap is removed to prevent spotting of touch-up finish.  
   3. Use touch-up paint sparingly. If large areas require touch-up, replace the damaged area with new pre-finished siding. Match touch up color to siding color through use of manufacturer's branded touch-up kits.

3.4 INSTALLATION - HARDIETRIM HZ10 BOARDS

A. Install materials in strict accordance with manufacturer's installation instructions. Install flashing around all wall openings.

B. Fasten through trim into structural framing or sheathing. Fasteners must penetrate minimum 3/4 inch or full thickness of sheathing. Additional fasteners may be required to ensure adequate security.

C. Place fasteners no closer than 3/4 inch and no further than 2 inches from side edge of trim board and no closer than 1 inch from end. Fasten maximum 16 inches on center.

D. Maintain clearance between trim and adjacent finished grade.

E. Fasten through overlapping boards. Do not nail between lap joints.

F. Overlay siding with single board of outside corner board then align second corner board to outside edge of first corner board. Do not fasten HardieTrim boards to HardieTrim boards.

3.5 PROTECTION

A. Protect installed products until completion of project.

B. Touch-up, repair or replace damaged products before Substantial Completion.

END OF SECTION
SECTION 07620
FLASHING AND SHEET METAL

PART 1 - GENERAL

1.01 QUALITY ASSURANCE
A. Quality Standards: In addition to complying with all pertinent codes and regulations, comply with all pertinent recommendations contained in "Architectural Sheet Metal Manual", current edition, of the Sheet Metal and Air conditioning Contractors National Association (SMACNA).

1.02 SUBMITTALS
A. Submit complete materials list of all items proposed to be furnished and installed under this section.
B. Submit scaled shop drawings showing layout, joining, profiles, and anchorages of fabricated work, including major counter flashings, gutters, downspouts, and expansion joint systems, and interface of the work with the work of adjacent trades.

1.03 JOB CONDITIONS
A. Coordinate work of this section with interfacing and adjoining work for proper sequencing of each installation. Ensure best possible weather resistance and durability of work and protection of materials and finishes.

PART 2 - PRODUCTS

2.01 MATERIALS
A. Zinc-Coated Steel: Commercial quality with 0.20% copper, ASTM A 525 except ASTM A 527 for lock-forming, G90 hot-dip galvanized, mill phosphatised where indicated for painting, 22 gage minimum except as otherwise indicated.
B. Solder: For use with steel, provide 50 - 50 tin/lead solder (ASTM B 32), with rosin flux.
C. Fasteners: Same metal as flashing and sheet metal or, other non-corrosive metal as recommended by sheet manufacturer. Match finish of exposed heads with material being fastened.
D. Bituminous Coating: Fed. Spec. TT-C-494 or SSPC-Paint 12, solvent type bituminous mastic, nominally free of sulfur, compounded for 15- mil dry film thickness per coat.
E. Mastic Sealant: Polyisobutylene; nonhardening, nonskinning, non-drying, nonmigrating sealant.
F. Elastomeric Sealant: Generic type recommended by manufacturer of metal and fabricator of components being sealed; comply with Fed. Spec. TT-S-0027, TT-S-00230, or TT-S-001543.
G. Reglets: Metal units of type and profile indicated, compatible with flashing indicated, non-corrosive, Fry Springlock Flashing system, by Fry Reglet Corp., or equal.
H. Metal Accessories: Provide sheet metal clips, straps, anchoring devices and similar accessory
units as required for installation of work, matching or compatible with material being installed, noncorrosive, size and gage required for performance.

I. Roofing Cement: ASTM D 2822, asphaltic.

J. Pipe Vents: As specified in Section 07325.

2.02 FABRICATED UNITS

A. Metal Fabrication:
   1. Shop-fabricate work to greatest extent possible.
   2. Comply with details shown, and with applicable requirements of SMACNA "Architectural Sheet Metal Manual" and other recognized industry practices.
   3. Fabricate for waterproof and weather-resistant performance; with expansion provisions for running work, sufficient to permanently prevent leakage, damage or deterioration of the work.
   4. Form work to fit substrates.
   5. Comply with material manufacturer instructions and recommendations for forming material.
   6. Form exposed sheet metal work without excessive oil-canning, buckling and tool marks, true to line and levels indicated, with exposed edges folded back to form hems.

B. Seams: Fabricate nonmoving seams in sheet metal with flat-lock seams not less than 3/4 inch wide, tin edges to be seamed, form seams, and solder.

C. Expansion Provisions: Where lapped or bayonet-type expansion provisions in work cannot be used, or would not be sufficiently water and weatherproof, form expansion joints of intermeshing hooked flanges, not less than 1" deep, filled with mastic sealant concealed within joints.
   1. Provide expansion and contraction joints at not more than 40 foot intervals. Space joints evenly.

D. Sealant Joints: Where movable, non-expansion type joints are indicated or required for proper performance of work, form metal to provide for proper installation of elastomeric sealant, in compliance with SMACNA standards.

E. Separations: Provide for separation of metal from non-compatible metal or corrosive substrates by coating concealed surfaces at locations of contract, with bituminous coating or other permanent separation as recommended by manufacturer and/or fabricator.

F. Expansion Joint Systems shall be as indicated and as specified in Section 05500, Metal Fabrications.

PART 3 - EXECUTION

3.01 INSTALLATION

A. Except as otherwise indicated, comply with manufacturer’s installation instructions and recommendations, and with SMACNA "Architectural Sheet Metal Manual".
1. Anchor units of work securely in place by methods indicated, providing for thermal expansion of metal units; conceal fasteners where possible, and set units true to line and level as indicated.

2. Install work such that all laps, joints and seams will be permanently watertight and weatherproof.

B. Bed flanges of work in a thick coat of bituminous roofing cement where required for waterproof performance.

C. Install reglets to receive counter flashing in manner and by methods indicated.
   1. Install counterflashing in reglets by snap-in seal arrangement.

D. Nailing will not be permitted through exposed faces of flashings.

E. Install cleats for sheet metal items 18 inches and over in width. Fasten cleats evenly at 12 inches on center. Cleats shall be at least 2 inches wide, 3 inches long, and of the same material and thickness as the sheet metal being installed.

F. Provide neoprene washers at exposed fastenings, to protect sheet metal and form a watertight connection.

G. Pipe Vent Flashing shall be installed as indicated. Extend lead flashing in continuous sheet up full height of pipe and turn down one inch minimum into pipe.

3.02 CLEANING AND PROTECTION

A. Clean exposed metal surfaces, removing substances which might cause corrosion of metal or deterioration of finishes.

B. Protection: Installer shall advise Contractor of required procedures for surveillance and protection of flashings and sheet metal work during construction, to ensure that work will be without damage or deterioration, other than natural weathering, at time of substantial completion.

END OF SECTION
SECTION 07920

SEALANTS

PART 1 - GENERAL

1.01 QUALITY ASSURANCE

A. Qualifications of Installers:

1. Proper installation of sealants require that installers be thoroughly trained and experienced in the necessary skills and thoroughly familiar with the specified requirements.

2. For installation of sealants throughout the Work, use only personnel who have been specifically trained in such procedures and who are completely familiar with the joint details shown on the Drawings and the installation requirements called for in this Section.

B. Adhesion Tests: Manufacturer shall perform adhesion tests on substrates.

1.02 SUBMITTALS

A. Submit the following:

1. A complete materials list showing all items proposed to be furnished and installed under this Section.

2. Specifications, color charts, installation instructions, and general recommendations from the materials manufacturers showing procedures under which it is proposed that the materials will be installed.

3. Certification that materials conform to the requirements of the U.S. Federal Specifications.

4. The VOC content of adhesives and sealants used must be less than the current VOC content limits of the South Coast Air Quality Management District (SCAQMD) Rule #1168, AND all sealants used as fillers must meet or exceed the requirements of the Bay Area Air Quality Management District Regulation 8, Rule 51.

1.03 PRODUCT DELIVERY, STORAGE AND HANDLING

A. Deliver to the job site in unopened containers or cartons, each bearing product name and color.

B. Store materials in waterproof, dry sheds. Do not permit material to freeze or be stacked in such a way as to cause damage to the containers.

1.04 WARRANTY

A. Provide a warranty to the Owner, signed by the applying contractor or firm, agreeing to make any repairs or replacements required because of faulty materials or workmanship, at no additional cost to the Owner, for a period of two years from date of completion of the Work. Exterior Work that does not remain weathertight and all Work which does not retain all properties inherent in the product will be considered faulty.
1.05 MISCELLANEOUS CAULKING AND SEALING WORK

A. The entire extent of sealing work is not necessarily fully or individually described here or on the drawings. Sealing shall be provided wherever required to prevent light leakage as well as moisture leakage. Refer to drawings for conditions and related parts of the work.

PART 2 - PRODUCTS

2.01 SEALANTS


D. Type D Sealant: Fed. Spec. TT-S-1657, Type 1 or 2, butyl-base sealant, PTI 707, Tremco "Butyl", or equal.

E. Acoustic Sealant: Fed. Spec. TT-S-1657 butyl sealer, pre-extruded, non-hardening, non-skinning mastic of sufficient dimension to maintain constant contact with adjoining surfaces (not less than 3/8 inch diameter or 1/4 by 1/2 inch if in flat form), packaged in rolls. Tremco "Acoustical Sealant", Lowery's "10A Acoustical Sealer", or equal.

F. Primer, if required, shall be non-staining and as recommended by the sealant manufacturer.

G. Backup: Shall be a polyethylene foam rod of rope, closed cell and 25% wider than the joint width.

H. Bond breaker, if required, shall be as recommended by the sealant manufacturer.

I. Solvents or cleaning agents shall be as recommended by the sealant manufacturer.

J. Colors:

1. Color of sealants shall match color of adjacent work. Colors for each sealant installation will be selected from manufacturer's standard colors by the Project Manager / Project Engineer.

2. In concealed installation, standard gray or black sealant may be used.
PART 3 - EXECUTION

3.01 WORKMANSHIP

A. At the start of the installation the manufacturer shall supply instruction in the use of his product to insure proper installation.

B. As work progresses, immediately remove sealant that may be adhered to adjacent materials.

3.02 JOINT DIMENSIONS

A. Joint dimension shall be as shown on the drawings. In joints up to 1/4 inch in width the depth of the sealant shall be the same as the joint width.

B. In open joints over 1/4 inch wide, the depth of the sealant shall be approximately one-half the width of the joint, but in no case less than 1/4 inch deep.

C. When open joints exceed the depth requirements, insert backup material to the necessary depth stated above. If not, place bond breaker tape in bottom of joint.

D. When perimeter joints around frames that are to be sealed do not have built-in stops, insert backup material to provide a joint with a minimum depth of 3/8 inch and a maximum depth of 1/2 inch.

3.03 APPLICATION

A. Back-up Material: Install in clean dry joints at the proper depth to provide sealant dimensions as specified earlier.

B. Masking: If required, shall be applied in continuous strips aligned with joint edge. Remove tape immediately after joints have been tooled.

C. Primer: If required, shall be used where recommended by the Sealant manufacturer.

D. Sealant: Shall be applied under pressure to clean dry joint, using hand or power guns, or other approved methods.

1. Nozzles shall be of the proper size and shape to form the required bead and completely fill the joint. Joint shall be filled from the bottom, making sure air bubbles are not left in the joint.

2. Joints shall be tooled as directed or approved, using lubricants recommended by the manufacturer. Joints shall be slightly concave and recessed at least 1/8" from the top of the joint.

3.04 SEALANT APPLICATION SCHEDULE

A. Type A: In general, at exterior or perimeters of openings in exterior walls such as concrete-to-concrete, metal-to-metal, metal-to-concrete, masonry, or stucco.

B. Type B: In general, at interior or perimeters of openings in exterior walls such as metal-to-metal, metal-to-concrete, masonry, or stucco.

C. Type C: In general, for use on areas subject to foot or vehicle traffic.
D. Type D: In general, for interior wall penetrations for piping or conduit which are to be covered by escutcheon or other trim or plate.

E. Acoustic Sealant: In general, for sound retardant sealant at sound-rated partitions or partitions with sound-retardant material therein.

3.05 MISCELLANEOUS SEALING WORK

A. The entire extent of sealing work is not necessarily fully or individually described herein. Sealing shall be provided wherever required to prevent light leakage as well as moisture leakage. Refer to drawings for conditions and related parts of the work.

B. All penetrations and openings in exterior walls shall be sealed in compliance with CAC Title 24 standards.

3.06 CLEANING

A. At the completion of this work, all surfaces adjoining joints shall be cleaned of all excess sealant and left in a neat condition subject to the approval of the Project Manager / Project Engineer.

END OF SECTION
SECTION 08110
METAL DOORS AND FRAMES

PART 1 - GENERAL

1.01 QUALITY ASSURANCE

A. Qualifications of Manufacturer: Products used in the work of this Section shall be produced by manufacturers regularly engaged in manufacture of similar items and with history of successful production acceptable to the Architect.

B. Comply with "Recommended Specifications, Standard Steel Doors and Frames", SDI 100, by the Steel Door Institute.

1.02 SUBMITTALS

A. Manufacturer's data - Submit the following:
   1. Complete materials list of all items proposed to be furnished and installed under this Section.
   2. Shop Drawings showing details of each frame type, elevations of each door design type, details of all openings, and all details of construction, installation, and anchorage.

B. Submit Certification indicating that the product meets the requirements of NFPA 80 for Fire Rated Doors.

PART 2 - PRODUCTS

2.01 MATERIALS

A. Supports and Anchors: Fabricate of not less than 18 gage galvanized sheet steel.

B. Inserts, Bolts and Fasteners: Manufacturer's standard units, except hot-dip galvanize items to be built into concrete or masonry walls, complying with ASTM A 153, Class C or D as applicable.

C. Shop Applied Paint: Use rust-inhibitive baked enamel or paint, suitable as a base for specified finish paints.

2.02 FABRICATION

A. Comply with SDI 100 for minimum materials and construction requirements.

B. Exposed Fasteners: Provide countersunk flat Phillips or Jackson heads for exposed screws and bolts.

C. Finish Hardware Preparation:
1. Prepare hollow metal units to receive mortised and concealed finish hardware, including cutouts, reinforcing, drilling and tapping in accordance with final Finish Hardware Schedule and templates provided by hardware suppliers. Comply with applicable requirements of ANSI A115.

2. Reinforce hollow metal units to receive surface-applied hardware. Drilling and tapping for surface-applied finish hardware may be done at site.

3. Locate finish hardware in accordance with "Recommended Locations for Builders Hardware", published by the National Builders Hardware Association.

D. Factory Finish:

1. Clean, treat and paint exposed surfaces of fabricated hollow metal units.

2. Clean steel surfaces of mill scale, rust, oil, grease, dirt and other foreign materials before the application of the shop coat of paint.

3. Apply shop coat of prime paint of even consistency to provide a uniformly finished surface ready to receive field applied finish.

4. Finish Coat: As specified for field finishing per Section 09900.

2.03 DOORS

A. Exterior Doors: UltraDor Series by Ceco Door Company, or equal, with polystyrene core. Door shall meet ANSI/SDI A250.8, Level 4, physical performance level A.

B. Construction: Doors shall be full flush type as indicated, 1-3/4 inch thick, fabricated from steel sheets, 16 gage at exterior doors, 18 gage at interior doors. Top and bottom edges to be flush and closed with minimum 16 gage channels at exterior doors and 18 gage channels at interior doors. All edges shall be full seam welded.

C. Internal Construction: Vertical and/or horizontal steel, rigidly formed members welded to the face panels with polystyrene core bonded to the inside of both faces.

2.04 STEEL FRAMES

A. Provide metal frames of the types and styles indicated on the Drawings or schedules and complying with SDI 100 for minimum materials and construction requirements.

1. Frames shall be Fire Rated to comply with the requirements of NFPA 80.

B. Fabricate frames of welded construction; exterior 14 gage, interior 16 gage. Miter all corners. Reinforce all hinge pockets with additional hinge reinforcement straps.

D. Door Silencers: Provide 3 silencers on strike jambs of frames.

E. Anchors: Provide anchors to secure the frame to adjoining construction. Provide steel anchors, zinc-coated or painted with rust-inhibitive paint, not lighter than 18 gauge.

1. Wall Anchors: Provide a minimum of three anchors for each jamb. Locate anchors opposite top and bottom hinges and midway between.
a. Stud Partitions: Weld or otherwise securely fasten anchors to backs of frames. Design anchors to be fastened to wood studs.

b. Masonry Walls: Install masonry wall anchors in masonry walls, as wall is being constructed, and grouted in place. Weld or otherwise securely fasten anchors to backs of frames.

2. Floor Anchors: Provide floor anchors drilled for 3/8-inch anchor bolts at bottom of each jamb member.

2.05 INFILTRATION/EXFILTRATION

A. When measured in accordance with ASTM E 283-73, doors shall not have an infiltration rate in excess of 0.5 cfm/sq. ft. per single doors or 1.0 cfm per sq. ft. per double door when subject to a pressure differential equivalent to that of a 25 mph wind.

PART 3 - EXECUTION

3.01 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 unsatisfactory conditions have been corrected.

3.02 INSTALLATION

A. Install metal doors, frames and accessories in accordance with manufacturer’s data, and as specified herein.

B. Setting Frames:

1. Comply with the provisions of SDI 100, unless otherwise indicated.

2. Set frames prior to construction of enclosing walls. Set frames accurately in position, plumbed, aligned, and braced securely until permanent anchors are set. After wall construction is completed, remove temporary braces and spreaders leaving surfaces smooth and undamaged.

3. When installed in prepared openings, install sealant between frame and wall in compliance with the requirements of Section 07920.

C. Door Installation:

1. Fit doors accurately in their respective frames, within clearances specified in SDI 100.

2. Clearance: Unless indicated otherwise, for non-rated doors provide clearances of 1/8" at jambs and heads; 1/8" at meeting stiles for pairs of doors; and 1/4" from bottom of door to top of decorative floor finish or covering. Where threshold is shown or scheduled, provide 1/4" clearance from bottom of door to top of threshold.
D. Security Access: Coordinate door installation with security access controls indicated.

3.03 ADJUST AND CLEAN

A. Final Adjustments: Check and readjust operating finish hardware items in hollow metal work just prior to final inspection. Leave work in complete and proper operating condition. Remove and replace defective work, including doors or frames which are warped, bowed or otherwise damaged.

B. Finish Coat Touch-up: Immediately after erection, sand smooth all rusted or damaged areas of prime coat and apply touch-up of compatible air-drying paint.

C. Painting of Metal Doors and Frames is specified in Section 09900, "Painting".

END OF SECTION
SECTION 08210
WOOD DOORS

PART 1 - GENERAL

1.01 QUALITY ASSURANCE
A. Standards:
   3. WDMA IS 1A-Window and Door manufacturers Association.
   4. Architectural Woodwork Institute (AWI), Section 1300 and 1500B.
B. Qualifications of Manufacturer: All wood doors shall bear the NWMA seal of approval and I.S. 1 stamp.
C. Submit Certification indicating that the product meets the requirements of NFPA 80 for Fire Rated Doors. All doors shall be the product of the same manufacturer to insure uniformity of quality and appearance throughout the project.
D. Provide each fire rated door with a label permanently attached to either the hinge stile or to the top rail, showing testing agency approval for classification scheduled.
E. The top of each door shall bear a label from the manufacturer indicating the door construction, face veneer species, cut and grade. If the doors are factory finished the label shall also have the finishing information.
F. The Door Manufacturer shall provide a letter, signed by an authorized company representative, to the Architect stating that the doors have been manufactured in compliance with this specification.

1.02 SUBMITTALS
A. Submit to scale shop drawings indicating general construction jointing methods, hardware locations, and locations of cut-outs for glass and louvers.
B. Submit manufacturer’s literature for materials provided.
C. Samples: submit veneer samples of specified veneer with the specified finish. Samples are to be submitted representing the color selected on veneer typical of grain patterns and coloration for the specified specie and cut.

1.03 PRODUCT HANDLING
A. No doors shall be delivered to the building until weatherproof storage space is available. Store doors in a space having controlled temperature and humidity range between 30 and 60 percent. Stack doors flat and off the floor, supported to prevent warping. Protect doors from damage and direct exposure to sunlight.
B. Factory finished doors shall be individually wrapped in polybags to protect the finish from damage by contact with other doors.

C. Do not walk or place other material on top of stacked doors. Do not drag doors across one another.

D. Contractor shall use all means necessary to protect doors from damage prior to, during, and after installation. All damaged doors shall be repaired or replaced by the contractor at no cost to the owner.

E. Doors shall be palletized at factory in stacks of no more than 30 doors per pallet. Door edges shall be protected with heavy corner guards.

F. Replacements: In the event of damage, immediately make all repairs and replacements necessary at no additional cost to the Owner.

1.04 GUARANTEE

A. All work in this Section shall be warranted by a FULL DOOR WARRANTY (from the date of installation) against defect in materials and workmanship, including the following:

1. Delamination in any degree.

2. Warp or twist of 3” or more in any 3’-6” x 7’-0” section of a door.

3. Telegraphing of any part of core assembly through face to cause surface variation of 1/100” or more in a 3” span.

4. Any defect which may, in any way, impair or affect performance of the door for the purpose which it is intended. Replacement under this warranty shall include hanging, installation of hardware, and finishing.

B. Periods of warranty after date of installation for Interior solid core and mineral core shall be the life of original installation.

C. Doors must be stored, finished, hung and maintained per manufacturer’s recommendations.

1.05 COORDINATION

A. Contractor shall be responsible for coordination and acquiring of all necessary information from hardware and metal frame manufacturers. Door manufacturer shall be responsible for coordinating all necessary information received by Contractor from hardware and metal frame manufacturers, in order that doors shall be properly prepared to receive hinges and hardware. Contractor shall provide his supplier with two copies of approved frame schedule, two copies of hardware schedule, and all necessary hardware templates.

PART 2 - PRODUCTS

2.01 DOORS

A. Doors shall conform to the drawings and Door Schedule and shall be of the size, thickness, and type indicated.
1. All doors and panels, unless noted otherwise on drawings or specified otherwise herein, shall be pre-fit to frames and pre-machined for hardware by the manufacturer. Take accurate field measurements of hardware mortises in metal frames to verify dimensions and alignment before proceeding with machining in factory.

B. Solid core wood flush doors shall be manufactured in accordance with the foregoing referenced standards, WIC grade as indicated, 5-ply wood veneer door by Marshfield Door Systems, Haley Architectural Wood Doors, Algoma, or equal.

1. Interior Doors: Birch stained, Rotary Cut, WMDA grade 1 (premium) grade faces for semi-transparent stain finish unless otherwise indicated.
   a. Doors shall be pre-finished in color as standard with the manufacturer.
   b. Factory finish doors in accordance with WDMA G-17 Finish System Description or AWI Division 1500–S-4 – Finish System Standards. Factory finish to be water based stain and ultraviolet (UV) cured polyurethane to comply with EPA Title 5 guidelines for Volatile Organic Compound (VOC) emissions limitations.

2. Only particle board core doors shall be used. Hollow core, wood stave, mineral core, honeycomb or other similar types of cores are not acceptable.

2.02 HARDWARE
   A. Finish hardware is specified in Section 08710.

2.03 FRAMES
   A. Door frames are specified in Section 08110.

PART 3 - EXECUTION

3.01 PREPARATION
   A. Installer must examine door frames and verify that frames are correct type and have been installed as required for proper hanging of corresponding doors and notify Contractor in writing of conditions detrimental to proper and timely installation of wood doors. Do not proceed with installation until unsatisfactory conditions have been corrected in a manner acceptable to installer.

3.02 INSTALLATION
   A. Condition doors to average prevailing humidity in installation area prior to hanging.
   B. Hardware: For installation requirements refer to Section 08710.
   C. Manufacturer's Instructions: Install wood doors in accordance with manufacturer's instructions and as shown.
   D. Clearance: Unless indicated otherwise, for non-rated doors provide clearances of 1/8” at jambs and heads; 1/8” at meeting stiles for pairs of doors; and 1/4” from bottom of door to top of decorative floor finish or covering. Where threshold is shown or scheduled, provide 1/4” clearance from bottom of door to top of threshold.
3.03 FINISHING

A. Stain, if required, to be selected from manufacturer’s standard colors or custom matched to Architects sample. Top and bottom of the doors to be sealed. Doors to be individually enclosed in a polybag.

1. All doors are to be factory finish. Any required field touchup must be done in compliance with VOC limits.

3.04 ADJUST AND CLEAN

A. Operation: Rehang or replace doors which do not swing or operate freely, as directed by Architect.

B. Refinish or replace doors damaged during installation, as directed by Architect.

C. Protection and Completed Work: Protect installed wood doors from damage or deterioration until acceptance of work.

END OF SECTION
SECTION 08306
ACCESS PANELS

PART 1 - GENERAL

1.01 SUBMITTALS
   A. Manufacturer’s Data to describe and illustrate each accessory at large scale and show installation method including requirement for blocking and backing, by others.

1.02 PRODUCT DELIVERY, STORAGE AND HANDLING
   A. Pack accessories individually in a manner to protect accessory and its finish.
   B. Protect adjacent or adjoining finished surfaces and work from damage during installation of work of this section.

PART 2 - PRODUCTS

2.01 MATERIALS
   A. Manufacturers: Milcor, JL Industries, Larsen’s Manufacturing Co., or equal.
   B. Flush Doors for Drywall Ceilings and Walls: Milcor Style DW flush panel access door, 16 gage stainless steel frame, 14 gage stainless steel door panel. Finish shall be satin stainless steel. Lock shall be flush, screwdriver-operated with steel cam.
   C. Flush Doors for Ceramic Tile Walls: Milcor Style MS, 16 gage stainless steel frame and door panel. Finish shall be satin stainless steel. Lock shall be flush, screwdriver-operated with steel cam.

2.02 OTHER MATERIALS
   A. Provide other materials, not specifically described but required for a complete and proper installation, as selected by the Contractor subject to the approval of the Architect.

PART 3 - EXECUTION

3.01 PREPARATION
   A. Deliver inserts and rough-in frames to jobsite at appropriate time for building-in. Provide templates and rough-in measurements as required.
   B. Examine the areas and conditions under which materials are to be placed. Correct conditions detrimental to the proper and timely completion of the Work. Do not proceed until unsatisfactory conditions have been corrected.
   C. Verify that required solid blocking and backing is provided as necessary for installation of specified units.
3.02 INSTALLATION
A. Install all items true, plumb and level, securely and anchored to substrate.

3.03 ADJUST AND CLEAN
A. Adjust hardware and panels after installation for proper operation.
B. Remove and replace panels or frames that are warped, bowed, or otherwise damaged.

END OF SECTION
SECTION 08331
OVERHEAD COILING DOORS

PART 1 - GENERAL

1.01 QUALITY ASSURANCE

A. Furnish all materials, services, testing, transportation and equipment necessary for and reasonably incidental to the completion of all work of this section, as indicated on drawings and specified herein. Work, materials and equipment not indicated or specified which is necessary for a 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.

B. Furnish each overhead coiling door as a complete unit produced by one manufacturer, including hardware, accessories, mounting and installation components.

C. Wind Loading: Design and reinforce overhead coiling doors to withstand a 20 lb. per sq. ft. wind loading pressure unless otherwise indicated.

1.02 SUBMITTALS

A. Product Data: Submit manufacturer's product data, roughing-in diagrams, and installation instructions for each type and size of overhead coiling door. Include operating instructions and maintenance information.

1. Submit product data for all materials to be supplied and installed under this section of work.

2. Submit samples for finish indicated.

B. Shop Drawings: Submit shop drawings for special components and installations which are not fully dimensioned or detailed on manufacturers data sheets.

PART 2 - PRODUCTS

2.01 MATERIALS

A. Manufacturers: Raynor Garage Door Company, The Overhead Door Company, Pacific Rolling Doors, or equal.

B. Door Curtain: Fabricate overhead coiling door curtain of interlocking slats designed to withstand required wind loading, of continuous length for width of door without splices. Unless otherwise indicated, provide slats of material gage recommended by the manufacturer for size and type of door required, and as follows:

1. Steel Door Curtain Slats: Structural quality, cold-rolled galvanized steel sheets complying with ANSI/ASTM A 446, Grade A, with G90 zinc coating, complying with ASTM A 525, and phosphate treated before fabrication.

   a. Furnish manufacturer's standard "flat-face" slats.

   b. Provide curtain slats with factory finished, baked-on epoxy prime coat and with baked
2. **Endlocks:** Malleable iron castings galvanized after fabrication, secured to curtain slats with galvanized rivets. Provide locks on alternate curtain slats for curtain alignment and resistance against lateral movement.

3. **Windlocks:** Malleable iron castings secured to curtain slats with galvanized rivets. Space windlocks approximately 24” o.c. on both edges of curtain.

4. **Bottom Bar:** Consisting of 2 angles, each not less than 1-1/2” x 1-1/2” x 1/8” thick, galvanized steel.
   a. Provide a replaceable gasket of flexible vinyl or neoprene between angles as a weather seal and cushion bumper for manually operated doors unless shown as an overlapping joint or specified otherwise.

5. **Curtain Jamb Guides:** Fabricate curtain jamb guides of steel angles, or channels and angles with sufficient depth and strength to retain curtain loading. Build-up units with minimum 3/16” thick steel sections, galvanized after fabrication. Slot bolt holes for track adjustment.
   a. Secure continuous wall angle to wall framing by 3/8” minimum bolts at not more than 30” o.c., unless closer spacing recommended by door manufacturer. Extend wall angles above door opening head to support coil brackets, unless otherwise shown. Place anchor bolts on exterior wall guides so they are concealed when door is in closed position. Provide removable stops on guides to prevent over-travel of curtain, and continuous bar for holding windlocks.

6. **Weather Seals:** Provide vinyl or neoprene weatherstripping for exterior exposed doors except where otherwise noted. At door heads, use 1/8” thick continuous sheet secured to inside of curtain coil hood. At door jambs, use 1/8” thick continuous strip secured to exterior side of jamb guide.

C. **Counterbalancing Mechanism:** Counterbalance doors by means of adjustable steel helical torsion spring, mounted around a steel shaft and mounted in a spring barrel and connected to the door curtain with the required barrel rings. Use grease-sealed bearings or self-lubricating graphite bearings for rotating members.

1. **Counterbalance Barrel:** Fabricate spring barrel of hot-formed structural quality carbon steel, welded or seamless pipe, of sufficient diameter and wall thickness to support roll-up of curtain without distortion of slats and limit barrel deflection to not more than 0.03” per ft. of span under full load.
   a. Provide spring balance of one or more oil-tempered, heat-treated steel helical torsion springs. Size springs to counterbalance weight of curtain, with uniform adjustment accessible from outside barrel. Provide cast steel barrel plugs to secure ends of springs to barrel and shaft.

   b. Fabricate torsion rod for counterbalance shaft of case-hardened steel, of required size to hold fixed spring ends and carry torsional load.

   c. Springs shall be rated for 100,000 cycles.

2. **Brackets:** Provide mounting brackets of manufacturer's standard design, either cast iron or cold-rolled steel plate with bell mouth guide groove for curtain.
3. Hood: Form to entirely enclosed coiled curtain and operating mechanism at opening head, and act as weather seal. Contour to suit end brackets to which hood is attached. Roll and reinforce top and bottom edges for stiffness. Provide closed ends for surface-mounted hoods, and any portion of between-jamb mounting projecting beyond wall face. Provide intermediate support brackets as required to prevent sag.

   a. Fabricate steel hoods for doors of not less than 24 gage hot-dip galvanized steel sheet with G 90 zinc coating, complying with ASTM A 525. Phosphate treat before fabrication.

   b. Factory finish to match finish on curtain slats.

D. Painting: For those parts not indicated to receive a factory finish, shop clean and prime non-factory finished ferrous metal surfaces, exposed and unexposed, except faying and lubricated surfaces and galvanized metal, with door manufacturer's standard rust inhibitive primer.

   1. Finish painting is specified in Section 09900, "Painting".

E. Electric Door Operators: Furnish electric door operator assembly of size and capacity recommended and provided by door manufacturer; complete with electric motor and factory-prewired motor controls, gear reduction unit, solenoid operated brake, remote control stations, control devices, conduit and wiring from controls to motor and central stations, and accessories required for proper operation. Door to operate at one foot per second.

   1. Provide hand-operated disconnect or a mechanism for automatically engaging a sprocket and chain operator and releasing brake for emergency manual operation. Mount disconnect and operator so they are accessible from floor level. Include an interlock device to automatically prevent motor from operating when emergency operator is engaged.

   2. Design operator so that motor may be removed without disturbing limit-switch adjustment and without affecting emergency auxiliary operator.

   3. Door Operator Type: Provide wall or bracket-mounted door operator units consisting of electric motor, worm gear drive from motor to reduction gear box, chain or worm gear drive from reduction box to gear wheel mounted on counterbalance shaft, and a disconnect-release for manual operation. Provide motor and drive assembly of horsepower and design as determined by door manufacturer for size of door required.

   4. Electric Motors: Provide high-starting torque, reversible, constant duty, Class A insulated electric motors with overload protection, sized to move door in either direction, from any position, at not less than 2/3' nor more than 1' per second.

      a. Coordinate wiring requirements and current characteristics of motors with building electrical system.

      b. Furnish open-drip-proof type motor and controller with NEMA Type I enclosure.

   5. Remote Control Station: Provide recessed momentary-contact, 3-button control station with push button controls labeled "open", "close" and "stop".

      a. Provide interior units, full-guarded type, recessed-mounted, heavy-duty, with general purpose NEMA Type 1 enclosure.

6. Remote Control Station shall be as specified in Section 08360.
7. Automatic Reversing Control Bottom Bar: Furnish each door with automatic safety switch, extending full width of door bottom, and located within neoprene or rubber astragal mounted to bottom door rail. Contact with switch before fully closing will immediately stop downward travel and reverse direction to fully opened position. Connect to control circuit through retracting safety cord and reel, or self-coiling cable.

8. Automatic Reversing Control Photo Eye: Door to be equipped with a minimum of one set of transmitter / receiver style photo eyes set at a height determined by the owner. Reflective type photo eyes shall not be allowed.

PART 3 - EXECUTION

3.01 INSTALLATION

A. Install door and operating equipment complete with necessary hardware, jamb and head mold strips, anchors, inserts, hangers, and equipment supports in accordance with final shop drawings, manufacturer’s instructions, and as specified herein.

B. Coordination: Coordinate all work with that of other trades. Insure that all required backing for mounting systems are in place. Coordinate electrical requirements to verify that necessary wiring and controls are in place. No exposed conduit and/or wiring will be permitted.

C. Upon completion of installation including work by other trades, lubricate, test and adjust doors to operate easily, free from warp, twist or distortion and fitting weathertight for entire perimeter.

END OF SECTION
SECTION 08380
BI-FOLD DOORS

PART 1 - GENERAL

1.01 QUALITY ASSURANCE

A. Furnish all materials, services, testing, transportation and equipment necessary for and reasonably incidental to the completion of all work of this section, as indicated on drawings and specified herein. Work, materials and equipment not indicated or specified which is necessary for a 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.

B. Furnish each Bi-Fold door as a complete unit produced by one manufacturer, including hardware, accessories, mounting and installation components.

C. Wind Loading: Doors shall be designed to withstand external or internal horizontal wind loads of 20 pounds per square foot. The maximum allowable deflection shall not exceed 1/120 of the span. Fiber stresses in main members shall be limited to 27,000 pounds per square inch. Steel frames shall be designed in accordance with the AISC "Steel Construction Manual".

1.02 SUBMITTALS

A. Product Data: Submittal Drawings showing fabrication and installation of four fold metal doors including plans, elevations, sections, details of components, hardware, operating mechanism, and attachments to the other units of Work. Include wiring diagrams and coordination with electrical trade.

1. Submit product data for all materials to be supplied and installed under this section of work.

2. Submit color samples for finish indicated.

B. Shop Drawings: Submit shop drawings for special components and installations which are not fully dimensioned or detailed on manufacturer's data sheets.

C. Installer Qualifications: Door installers must have a minimum of five years similar experience.

PART 2 - PRODUCTS

2.01 MANUFACTURER

A. Door Engineering and Manufacturing (aka DEMCO), Kasota, MN, Bator Doors, or equal.

1. Distributed by: Byron Epp, Inc., Laguna Hills, CA / (877) 377-6030

2. Richards-Wilcox Distributed by: Bator Industrial Doors, (206) 681-6093

2.02 MATERIALS

A. Structural Steel: ASTM A36/A36M.

B. Steel Sheets: Steel sheets of commercial quality, complying with ASTM A366/A366M cold-rolled steel sheet, or A569/A569M hot-rolled steel sheet.
2.03 BIFOLD DOORS

A. Construction: Door framing shall be minimum 14-gauge structural steel tube with 14-gauge steel sheet on the exterior and interior faces. Sheetling shall be formed on the vertical edges with no visible welds on the interior or exterior panel faces. All frames and framing members shall be true to dimension and square in all directions, and no door shall be bowed, warped, or out of line, in the vertical or horizontal plane of the door opening by more than 1/8 inch in 20 feet. Exposed welds and welds which interfere with the installation of various parts shall be ground smooth and flush.

B. Surface Mounted Tube Frame: Supply pre-hung tube frame system constructed of minimum TS6x4x0.25, designed to anchor to masonry wall construction or weld to steel structure. All hinges, track supports and operator supports shall be factory attached.

C. Factory finish: Door Panels and Tube Frames shall be finished with manufacturer’s standard PPG Spectracron epoxy primer and polyurethane top coat. Customer to select from manufacturer’s standard color chart or furnish sample to match.

a. Operator and operating hardware shall be powder-coated manufacturer’s standard gray.

D. Hardware: Hardware shall include guide tracks and brackets, trolleys, center guides, not less than three pairs of jamb and fold hinges per opening, and all bolts, nuts, fasteners, etc. necessary for complete installation and operation.

E. Hinges: Jamb hinges shall be dual shear and have two thrust bearings and two needle bearings. Fold hinges shall be stainless steel and be dual shear with two thrust bearings. All bearings shall be completely concealed within the hinge barrel and include grease zerks. All hinge pins shall be minimum ¾” diameter hardened steel.

F. Weatherstripping: Material shall be adjustable and readily replaceable and provide a substantially weather-tight installation. Weatherstripping at center shall be 1/16” cloth inserted neoprene and include no exposed fasteners on the exterior face of the panel. Weatherstripping at sill shall include two 1/16” cloth inserted neoprene sweeps with an aluminum retainer. The retainer shall be attached to the door with adhesive.

G. Perimeter Weatherstripping: Provide jamb and head weatherstripping of 1/16” cloth-inserted neoprene bulb (or closed cell neoprene).

H. Vision Panels or Grilles: Provide 1” insulated vision panels or grilles of the size, shape and location as noted on the drawings.

I. Painting: For those parts not indicated to receive a factory finish, shop clean and prime non-factory finished ferrous metal surfaces, exposed and unexposed, except faying and lubricated surfaces and galvanized metal, with door manufacturer’s standard rust inhibitive primer.

1. Finish painting is specified in Section 09900, “Painting”.

2.04 ELECTRO-MECHANICAL OPERATOR

A. Each Bi-Fold door shall be operated by an overhead mounted electro-mechanical drive unit
designed for high cycle operation. Operator consists of an electric motor, gear reducer, and rotating drive arm. The door shall be operated with connecting rods attached to the rotating drive arm on the operator and to control arms attached to the jamb door section and to the door lintel. The connecting rods shall be positive drive, keeping the door under firm control at all times. The connecting rods shall be fitted with spherical bearings and control arms shall be equipped with oil impregnated bronze bearings on polished shafts.

B. Operator shall be instantly reversible, open and close rapidly and start and stop gradually. Operator shall be adjustable to allow door to fully clear the opening. Operator shall automatically lock the door in the closed position. Operator shall be equipped with disengaging mechanism to convert to free wheeling mode for manual operation.

C. Electric motor shall be of sufficient size to operate doors under normal operating conditions at no more than 75 percent of rated capacity. The motor shall be wound for three phase 208/230/480 VAC, 60 Hertz operation.

D. Electric Controls: Controls shall be furnished by the door manufacturer and shall be complete for each door, and built in accordance with the latest NEMA standards.

1. Motor starters shall be magnetic reversing, factory wired with overload and under voltage protection, and equipped with mechanical interlocks. All control components shall be enclosed in one enclosure with a wiring diagram placed on the inside of the cover.

2. If incoming voltage is single phase, control panel shall include a variable frequency drive to convert voltage to 3-phase for the motor.

3. Enclosures shall be NEMA 4 with disconnect switch.

4. Pushbuttons (interior) for each door shall have one (1) momentary pressure three-button push-button station marked “OPEN”, “CLOSE” and “STOP”. Push button enclosure shall be NEMA 4.

5. Limit switches shall be provided to stop the travel of the door in its fully open or fully closed position.

6. Safety edges: Provide electric safety edges on leading edge of all doors to reverse door upon contact with obstruction.

7. Photo eyes: Provide (1) exterior, jamb mounted, thru-beam type photo eyes, NEMA 4 rated.


9. Radio controls: as noted below.

10. Wiring: Door manufacturer shall supply controls and components only. Electrical contractor shall install controls and furnish and install conduits and wiring for jobsite power and control wiring.

E. Electric Controls: Controls shall be furnished by the door manufacturer and shall be complete for each door, and built in accordance with the latest NEMA standards. Control circuits shall not exceed a nominal 24 volts.

1. Controls shall include a programmable logic controller with digital message display.
Controller shall include programmable close timers and programmable inputs/outputs.

2. Doors that do not utilize a programmable logic controller (PLC) will not be permitted.

3. Enclosures shall be NEMA 4 with disconnect switch.

5. Limit switches shall be provided to stop the travel of the door in its fully open or fully closed position.

6. Remote Control Station (at main control location and at each door): Provide momentary-contact, 3-button control station with push button controls labeled "open", "close" and "stop".
   a. Provide interior units, full-guarded type, recessed-mounted, heavy-duty, with general purpose NEMA enclosure, #800T, by Rockwell Automation, or equal.
   b. At main control location provide single, NEMA enclosure to house all door buttons and labels to indicate door controlled.
   c. Control Buttons shall be #800H, flush head, 30 mm diameter. by Rockwell Automation, or equal.

7. Remote Control Signal: Doors shall be internally wired to provide for operation by remote signal for opening, closing and stopping. Provide four-station control, two remote units for each door.
   a. Units shall be Allstar, Model MVP-831E to match existing. Transmitter shall be 639/9 channel. Buttons shall operate both front and rear doors and shall be compatible with access gate remote controls. Provide with antennae system capable of picking up signal from street.
   b. Coordinate with Sectional door specification and provide controls compatible with each type of door.
   c. Provide a total of 12 transmitters.
   d. Provide antennas as required to extend the range of the control systems such that the doors can be controlled from anywhere on site.

8. All control wiring shall be provided and installed by door contractor, including door controls, overrides and photo eyes.

E. Emergency Override Switch: Provide push button type switch with radio control per manufacturer for override of photo eye and safety edge.

F. Door Operation: Automatic Close: Doors shall time out and close once the exterior photo eye is activated and cleared. Provide Auto/Manual switch. In Auto, the remotes shall open doors only. In Manual, the remotes shall open, stop and close the doors and the auto close function shall be disabled.

PART 3 - EXECUTION

3.01 INSTALLATION

A. Install Bi-Fold metal doors in strict accordance with the approved drawings by qualified door
erection crews. All door openings shall be completely prepared by the general contractor prior to the installation of the doors. Permanent or temporary electric wiring shall be brought to the door opening before installation is started and shall be completed so as not to delay the inspection test.

B. Doors shall be set plumb, level, and square, and with all parts properly fastened and mounted. All moving parts shall be tested and adjusted and left in good operating condition.

3.2 ADJUSTING AND CLEANING

A. Inspection of the doors and a complete operating test will be made by the installer in the presence of the architect as soon as the erection is complete. Any defects noted shall be corrected.

B. Clean surfaces and repaint abraded or damaged surfaces to match factory-applied finish.

C. Coordination: Coordinate all work with that of other trades. Insure that all required backing for mounting systems are in place. Coordinate electrical requirements to verify that necessary wiring and controls are in place. **No exposed conduit and/or wiring will be permitted.**

D. Upon completion of installation including work by other trades, lubricate, test and adjust doors to operate easily, free from warp, twist or distortion and fitting weathertight for entire perimeter.

**END OF SECTION**
SECTION 08540
COMPOSITE WINDOWS

PART 1 - GENERAL

1.01 QUALITY ASSURANCE

A. Design criteria: Drawings indicate sizes, profiles and dimensional requirements of thermally improved composite windows. Window units having minor deviations from dimensions and profiles indicated on drawings may be accepted, provided such deviations do not materially detract from design concept or intended performances and subject to approval of the Architect.

B. Standards: Except as otherwise indicated, requirements for thermally improved composite windows, terminology and standards of performance, and fabrication workmanship are those specified and recommended in AAMA/NWWDA 101/93 (American Architectural Manufacturer’s Association) applicable general recommendations published by AAMA and AA.

C. Performance and Testing:

1. Except as otherwise indicated, comply with air infiltration tests, water resistance tests, uniform load deflection tests, and uniform load structural tests specified in ANSI/AAMA 302.9 for type and classification of window units required in each case.


   b. Air infiltration: Maximum 0.32 CFM per foot of overall sash crack at inward test pressure of 1.57, ASTM E 283.

   c. Water penetration: No water penetration at inward test pressure of 3.0 psf, ASTM E 547.

   d. Structural performance: No glass breakage, damage to hardware, permanent deformation at positive and negative test pressure of 30.0 psf, ASTM E 330 - 90.

2. Testing: Where manufacturer's standard window units comply with requirements and have been tested in accordance with specified tests, provide certification by manufacturer showing compliance with such tests; otherwise, perform required tests through a recognized testing laboratory or agency and provide certified test result.

   a. Windows to meet performance standards for:

      1). ASTM E 283 - 91 Test method for infiltration rate of air leakage through exterior windows, curtain walls, and doors under specified pressure differences across the specimen.

      2). ASTM E 330 - 90 Test method for structural performance of exterior windows, and doors by uniform static air pressure difference.

      3). ASTM E 547 - 93 Test method for water penetration of exterior windows, curtain walls, and doors by cyclic static air pressure differential.
1.02 SUBMITTALS

A. Product Data: Submit manufacturer’s technical product data, recommendations, and standard details for thermally improved composite windows units, including certified test laboratory reports as necessary to show compliance with requirements.

B. Submit complete materials list of all items proposed to be furnished and installed under this Section.

C. Submit Shop Drawings including wall elevations at 1/4 inch scale, typical unit elevations at 3/4 inch scale, and full size detail sections of every typical composite member and wall construction type. Show anchors, hardware, screens and other components not included in manufacturer’s standard data. Include glazing details.

D. Provide certification that units comply with the requirements and have been tested in accordance with specified tests.

E. Samples: Submit samples of composite frame with required interior and exterior finish applied.

1.03 PRODUCT HANDLING

A. Comply with pertinent provisions of Section 01600.

1.04 QUALIFICATIONS

A. Manufacturer: Company specializing in manufacturing thermally improved composite windows and a minimum five years documented experience.

1.05 WARRANTY

A. Provide manufacturer’s standard warranty which agrees to repair or replace units that fail in workmanship for a period of ten years from the original date purchase. Warranty includes coverage of materials and labor in full by the manufacturer.

PART 2 - PRODUCTS

2.01 MATERIALS

A. Andersen Corporation: Andersen 100 Series, or approved equal. Windows shall be dual glazed of the types indicated (2-1/4” frame with nailing fin).

1. Windows shall be gliding and picture as indicated.


B. Fabrication

1. Fabricate framing, mullions and sash members with mechanically joined, mitered, sealed corners and joints. Supplement frame sections at corners with structural hidden corner keys.

2. Fabricate components with minimum clearances and shim spacing around perimeter of assembly, yet enabling installation and dynamic movement of perimeter seal.
3. Provide internal offset weepholes & channels to migrate moisture outside. Weepholes should be covered by weep gates.
4. Prepare components to receive anchor devices.
5. Provide integral weather stop flange to perimeter of unit.
6. Provide soft vinyl T-bulb or polypropylene fin seal weather-stripping.
7. Assemble insect screens to fully integrate with window frame. Frames to be manufactured of cambered aluminum and reinforced with rigid plastic corner keys. Screen mesh to fit taut in frame and secured. Locate screens on inside or outside of window sash or ventilator, depending on window type. Design windows and hardware to accommodate screens in a tight-fitting removable arrangement with a minimum of exposed fasteners and latches.

C. Glazing: Factory exterior glazed except where field glazing is required due to large window unit dimensions. Units shall be reglazeable without dismantling sash framing. Comply with requirements of Section 08800 for type of glass and glazing materials.
1. Provide glazing bead to match exterior window finish.
2. Glazing area in vent to be equally proportional to glazing area in fixed unit resulting in equal sight lines.

D. Hardware: Provide the manufacturer’s standard hardware fabricated from a corrosive resistant material and of sufficient strength to perform its intended function. For application of exposed hardware, use fasteners that match the finish of the hardware being fastened.

2.02 OTHER MATERIALS
A. All other materials, not specifically described but required for a complete and proper installation, including but not limited to pole operators, shall be new, first quality of their respective kinds, and subject to approval of the Architect.

PART 3 - EXECUTION

3.01 SURFACE CONDITIONS
A. Inspection: Prior to installation of the work of this Section, carefully inspect the installed work of all other trades and verify that all such work is complete to the point where this installation may properly commence.

3.02 INSTALLATION
A. Install all windows with adequate provision for settling, expanding, and contracting to occur without breaking glass. Windows shall be factory sized to fit in each framed opening so that the net sized window is 1/2" smaller than the framed (rough) opening to allow 1/4" clearance on all sides (tolerance +/- 1/16") and with weep holes at bottom in a weathertight manner.
B. Opening panels must be closed and locked during installation. Windows must be installed level, plumb and square with 1/4" clearance on all sides and with weep holes at bottom in a weathertight manner.
C. Headers must not be nailed. Nail through nailing fin into framing along sides and base. At the head, finishing nails may be placed 1/2” above the frame and bent down over frame to allow for header deflection. Full support is required along entire length of sill.

D. Protection:

1. Protect all finished surfaces as necessary to prevent damage during progress of the Work.

3.03 CLEANING UP

A. Immediately prior to acceptance of the Work, remove all protective materials from the windows and clean all exposed members.

B. Wash down surfaces with solution of mild detergent in warm water, applied with soft, clean wiping cloths. Take care to remove dirt from corners. Wipe surfaces clean.

C. Do not use petroleum distillants.

D. Abrasives: Do not use abrasives or harmful cleaning agents.

END OF SECTION
SECTION 08710
FINISH HARDWARE

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. Mechanical door hardware for:
      a. Swinging doors.
      b. Sliding doors.
      c. Gates.

B. Exclusions: Unless specifically listed in hardware sets, hardware is not specified in this section for:
   1. Windows
   2. Cabinets (casework), including locks in cabinets
   3. Signage
   4. Toilet accessories
   5. Overhead doors

C. Related Sections:
   1. Division 01 Section “Alternates” for alternates affecting this section.
   2. Division 07 Section “Joint Sealants” for sealant requirements applicable to threshold installation specified in this section.

1.3 REFERENCES

A. UL - Underwriters Laboratories
   1. UL 10B - Fire Test of Door Assemblies
   2. UL 10C - Positive Pressure Test of Fire Door Assemblies
   3. UL 1784 - Air Leakage Tests of Door Assemblies
   4. UL 305 - Panic Hardware

B. DHI - Door and Hardware Institute
   1. Sequence and Format for the Hardware Schedule
   2. Recommended Locations for Builders Hardware
3. Key Systems and Nomenclature

C. ANSI - American National Standards Institute

1. ANSI/BHMA A156.1 - A156.29, and ANSI/BHMA A156.31 - Standards for Hardware and Specialties

1.4 SUBMITTALS

A. General:

1. Submit in accordance with Conditions of Contract and Division 01 requirements.
2. Highlight, encircle, or otherwise specifically identify on submittals deviations from Contract Documents, issues of incompatibility or other issues which may detrimentally affect the Work.
3. Prior to forwarding submittal, comply with procedures for verifying existing door and frame compatibility for new hardware, as specified in PART 3, “EXAMINATION” article, herein.

B. Action Submittals:

1. Product Data: Product data including manufacturers’ technical product data for each item of door hardware, installation instructions, maintenance of operating parts and finish, and other information necessary to show compliance with requirements.
2. Samples for Verification: If requested by Architect, submit production sample or sample installations of each type of exposed hardware unit in finish indicated, and tagged with full description for coordination with schedule.
   a. Samples will be returned to supplier in like-new condition. Units that are acceptable to Architect may, after final check of operations, be incorporated into Work, within limitations of key coordination requirements.
3. Door Hardware Schedule: Submit schedule with hardware sets in vertical format as illustrated by Sequence of Format for the Hardware Schedule as published by the Door and Hardware Institute. Indicate complete designations of each item required for each door or opening, include:
   a. Door Index; include door number, heading number, and Architects hardware set number.
   b. Opening Lock Function Spreadsheet: List locking device and function for each opening.
   c. Type, style, function, size, and finish of each hardware item.
   d. Name and manufacturer of each item.
   e. Fastenings and other pertinent information.
   f. Location of each hardware set cross-referenced to indications on Drawings.
   g. Explanation of all abbreviations, symbols, and codes contained in schedule.
   h. Mounting locations for hardware.
   i. Door and frame sizes and materials.
   j. Name and phone number for local manufacturer’s representative for each product.
4. Key Schedule:
   a. After Keying Conference, provide keying schedule listing levels of keying as well as explanation of key system’s function, key symbols used and door numbers controlled.
   b. Use ANSI/BHMA A156.28 “Recommended Practices for Keying Systems” as guideline for nomenclature, definitions, and approach for selecting optimal keying system.
c. Provide 3 copies of keying schedule for review prepared and detailed in accordance with referenced DHI publication. Include schematic keying diagram and index each key to unique door designations.
d. Index keying schedule by door number, keyset, hardware heading number, cross keying instructions, and special key stamping instructions.
e. Provide one complete bitting list of key cuts and one key system schematic illustrating system usage and expansion.
   1) Forward bitting list, key cuts and key system schematic directly to Coastside Fire Protection District, by means as directed by Coastside Fire Protection District.
f. Prepare key schedule by or under supervision of supplier, detailing Coastside Fire Protection District’s final keying instructions for locks.

5. Templates: After final approval of hardware schedule, provide templates for doors, frames and other work specified to be factory prepared for door hardware installation.

C. Informational Submittals:

1. Qualification Data: For Supplier and Installer.
2. Certificates of Compliance:
   a. Certificates of compliance for fire-rated hardware and installation instructions if requested by Architect or Authority Having Jurisdiction.
   b. Installer Training Meeting Certification: Letter of compliance, signed by Contractor, attesting to completion of installer training meeting specified in “QUALITY ASSURANCE” article, herein.

3. Product Test Reports: For compliance with accessibility requirements, based on evaluation of comprehensive tests performed by manufacturer and witnessed by qualified testing agency, for door hardware on doors located in accessible routes.
4. Warranty: Special warranty specified in this Section.

D. Closeout Submittals:

1. Operations and Maintenance Data: Provide in accordance with Division 01 and include:
   a. Complete information on care, maintenance, and adjustment; data on repair and replacement parts, and information on preservation of finishes.
   b. Catalog pages for each product.
   c. Name, address, and phone number of local representative for each manufacturer.
   d. Parts list for each product.
   e. Final approved hardware schedule, edited to reflect conditions as-installed.
   f. Final keying schedule
   g. Copies of floor plans with keying nomenclature
   h. As-installed wiring diagrams for each opening connected to power, both low voltage and 110 volts.
   i. Copy of warranties including appropriate reference numbers for manufacturers to identify project.

1.5 QUALITY ASSURANCE

A. Product Substitutions: Comply with product requirements stated in Division 01 and as specified herein.
1. Where specific manufacturer’s product is named and accompanied by “No Substitute,” including make or model number or other designation, provide product specified. (Note: Certain products have been selected for their unique characteristics and particular project suitability.)

   a. Where no additional products or manufacturers are listed in product category, requirements for “No Substitute” govern product selection.

2. Where products indicate “acceptable manufacturers” or “acceptable manufacturers and products”, provide product from specified manufacturers, subject to compliance with specified requirements and “Single Source Responsibility” requirements stated herein.

B. Supplier Qualifications and Responsibilities: Recognized architectural hardware supplier with record of successful in-service performance for supplying door hardware similar in quantity, type, and quality to that indicated for this Project.

   1. Warehousing Facilities: In Project's vicinity.
   2. Scheduling Responsibility: Preparation of door hardware and keying schedules.

C. Installer Qualifications: Qualified tradesmen, skilled in application of commercial grade hardware with record of successful in-service performance for installing door hardware similar in quantity, type, and quality to that indicated for this Project.

D. Single Source Responsibility: Obtain each type of door hardware from single manufacturer.

E. Fire-Rated Door Openings: Provide door hardware for fire-rated openings that complies with NFPA 80 and requirements of authorities having jurisdiction. Provide only items of door hardware that are listed and are identical to products tested by Underwriters Laboratories, Intertek Testing Services, or other testing and inspecting organizations acceptable to authorities having jurisdiction for use on types and sizes of doors indicated, based on testing at positive pressure and according to NFPA 252 or UL 10C and in compliance with requirements of fire-rated door and door frame labels.

F. Smoke- and Draft-Control Door Assemblies: Where smoke- and draft-control door assemblies are required, provide door hardware that meets requirements of assemblies tested according to UL 1784 and installed in compliance with NFPA 105.

   1. Air Leakage Rate: Maximum air leakage of 0.3 cfm/sq. ft. (3 cu. m per minute/sq. m) at tested pressure differential of 0.3-inch wg (75 Pa) of water.

G. Means of Egress Doors: Latches do not require more than 5 lbf (22.2 N) to release latch. Locks do not require use of key, tool, or special knowledge for operation.

H. Accessibility Requirements: For door hardware on doors in an accessible route, comply with governing accessibility regulations cited in “REFERENCES” article, herein.

   1. Provide operating devices that do not require tight grasping, pinching, or twisting of wrist and that operate with force of not more than 5 lbf (22.2 N).
   2. Maximum opening-force requirements:

      a. Interior, Non-Fire-Rated Hinged Doors: 5 lbf (22.2 N) applied perpendicular to door.
      b. Sliding or Folding Doors: 5 lbf (22.2 N) applied parallel to door at latch.
      c. Fire Doors: Minimum opening force allowable by authorities having jurisdiction.

   3. Bevel raised thresholds with slope of not more than 1:2. Provide thresholds not more than 1/2 inch (13 mm) high.
4. Adjust door closer sweep periods so that, from open position of 70 degrees, door will take at least 3 seconds to move to 3 inches (75 mm) from latch, measured to leading edge of door.

I. Keying Conference: Conduct conference at Project site to comply with requirements in Division 01.

2. Incorporate keying conference decisions into final keying schedule after reviewing door hardware keying system including:
   a. Function of building, flow of traffic, purpose of each area, degree of security required, and plans for future expansion.
   b. Preliminary key system schematic diagram.
   c. Requirements for key control system.
   d. Requirements for access control.
   e. Address for delivery of keys.

J. Pre-installation Conference: Conduct conference at Project site

1. Review and finalize construction schedule and verify availability of materials, Installer's personnel, equipment, and facilities needed to make progress and avoid delays.
2. Inspect and discuss preparatory work performed by other trades.
3. Review required testing, inspecting, and certifying procedures.

K. Coordination Conferences:

1. Installation Coordination Conference: Prior to hardware installation, schedule and hold meeting to review questions or concerns related to proper installation and adjustment of door hardware.
   a. Attendees: Door hardware supplier, door hardware installer, Contractor.
   b. After meeting, provide letter of compliance to Architect, indicating when meeting was held and who was in attendance.

1.6 DELIVERY, STORAGE, AND HANDLING

A. Inventory door hardware on receipt and provide secure lock-up for hardware delivered to Project site.

B. Tag each item or package separately with identification coordinated with final door hardware schedule, and include installation instructions, templates, and necessary fasteners with each item or package.

1. Deliver each article of hardware in manufacturer's original packaging.

C. Project Conditions:

1. Maintain manufacturer-recommended environmental conditions throughout storage and installation periods.
2. Provide secure lock-up for door hardware delivered to Project, but not yet installed. Control handling and installation of hardware items so that completion of Work will not be delayed by hardware losses both before and after installation.
D. Protection and Damage:
   1. Promptly replace products damaged during shipping.
   2. Handle hardware in manner to avoid damage, marring, or scratching. Correct, replace or repair products damaged during Work.
   3. Protect products against malfunction due to paint, solvent, cleanser, or any chemical agent.

E. Deliver keys to manufacturer of key control system for subsequent delivery to Coastside Fire Protection District.

F. Deliver keys and permanent cores as directed by Coastside Fire Protection District.

1.7 COORDINATION

A. Coordinate layout and installation of floor-recessed door hardware with floor construction. Cast anchoring inserts into concrete. Concrete, reinforcement, and formwork requirements are specified in Division 03.

B. Installation Templates: Distribute for doors, frames, and other work specified to be factory prepared. Check Shop Drawings of other work to confirm that adequate provisions are made for locating and installing door hardware to comply with indicated requirements.

C. Security: Coordinate installation of door hardware, keying, and access control with Coastside Fire Protection District's security consultant.

D. Existing Openings: Where hardware components are scheduled for application to existing construction or where modifications to existing door hardware are required, field verify existing conditions and coordinate installation of door hardware to suit opening conditions and to provide proper door operation.

E. Direct shipments not permitted, unless approved by Contractor.

1.8 WARRANTY

A. Special Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace components of door hardware that fail in materials or workmanship within specified warranty period.
   1. Warranty Period: Years from date of Substantial Completion, for durations indicated.
      a. Closers:
         1) Mechanical: 30 years.
      b. Exit Devices:
         1) Mechanical: 3 years.
      c. Locksets:
         1) Mechanical: 3 years.
      d. Continuous Hinges: Lifetime warranty
      e. Key Blanks: Lifetime
2. Warranty does not cover damage or faulty operation due to improper installation, improper use or abuse.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. The Coastside Fire Protection District requires use of certain products for their unique characteristics and particular project suitability to insure continuity of existing and future performance and maintenance standards. After investigating available product offerings, the Awarding Authority has elected to prepare proprietary specifications. These products are specified with the notation: “No Substitute.”

1. Where “No Substitute” is noted, submittals and substitution requests for other products will not be considered.

B. Approval of manufacturers and/or products other than those listed as “Scheduled Manufacturer” or “Acceptable Manufacturers” in the individual article for the product category shall be in accordance with QUALITY ASSURANCE article, herein.

C. Approval of products from manufacturers indicated in “Acceptable Manufacturers” is contingent upon those products providing all functions and features and meeting all requirements of scheduled manufacturer’s product.

D. Hand of Door: Drawings show direction of slide, swing, or hand of each door leaf. Furnish each item of hardware for proper installation and operation of door movement as shown.

E. Where specified hardware is not adaptable to finished shape or size of members requiring hardware, furnish suitable types having same operation and quality as type specified, subject to Architect's approval.

2.2 MATERIALS

A. Fasteners

1. Provide hardware manufactured to conform to published templates, generally prepared for machine screw installation.

2. Furnish screws for installation with each hardware item. Finish exposed (exposed under any condition) screws to match hardware finish, or, if exposed in surfaces of other work, to match finish of this other work including prepared for paint surfaces to receive painted finish.

3. Provide concealed fasteners for hardware units exposed when door is closed except when no standard units of type specified are available with concealed fasteners. Do not use thru-bolts for installation where bolt head or nut on opposite face is exposed in other work unless thru-bolts are required to fasten hardware securely. Review door specification and advise Architect if thru-bolts are required.

4. Install hardware with fasteners provided by hardware manufacturer.

B. Provide screws, bolts, expansion shields, drop plates and other devices necessary for hardware installation.

1. Where fasteners are exposed to view: Finish to match adjacent door hardware material.
2.3 HINGES

A. Manufacturers and Products:

1. Scheduled Manufacturer and Product: Ives 5BB series

B. Requirements:

1. Provide five-knuckle, ball bearing hinges conforming to ANSI/BHMA A156.1.
2. 1-3/4 inch (44 mm) thick doors, up to and including 36 inches (914 mm) wide:
   a. Exterior: Standard weight, bronze or stainless steel, 4-1/2 inches (114 mm) high
   b. Interior: Standard weight, steel, 4-1/2 inches (114 mm) high
3. 1-3/4 inch (44 mm) thick doors over 36 inches (914 mm) wide:
   a. Exterior: Heavy weight, bronze/stainless steel, 5 inches (127 mm) high
   b. Interior: Heavy weight, steel, 5 inches (127 mm) high
4. 2 inches or thicker doors:
   a. Exterior: Heavy weight, bronze or stainless steel, 5 inches (127 mm) high
   b. Interior: Heavy weight, steel, 5 inches (127 mm) high
5. Provide three hinges per door leaf for doors 90 inches (2286 mm) or less in height, and one additional hinge for each 30 inches (762 mm) of additional door height.
6. Where new hinges are specified for existing doors or existing frames, provide new hinges of identical size to hinge preparation present in existing door or existing frame.
7. Hinge Pins: Except as otherwise indicated, provide hinge pins as follows:
   a. Steel Hinges: Steel pins
   b. Non-Ferrous Hinges: Stainless steel pins
   c. Out-Swinging Exterior Doors: Non-removable pins
   d. Out-Swinging Interior Lockable Doors: Non-removable pins
   e. Interior Non-lockable Doors: Non-rising pins
8. Width of hinges: 4-1/2 inches (114 mm) at 1-3/4 inch (44 mm) thick doors, and 5 inches (127 mm) at 2 inches (51 mm) or thicker doors. Adjust hinge width as required for door, frame, and wall conditions to allow proper degree of opening.
9. Doors 36 inches (914 mm) wide or less furnish hinges 4-1/2 inches (114 mm) high; doors greater than 36 inches (914 mm) wide furnish hinges 5 inches (127 mm) high, heavy weight or standard weight as specified.
10. Provide spring hinges where specified. Provide two spring hinges and one bearing hinge per door leaf for doors 90 inches (2286 mm) or less in height. Provide one additional bearing hinge for each 30 inches (762 mm) of additional door height.

2.4 CONTINUOUS HINGES

A. Aluminum Geared

1. Manufacturers:
   a. Scheduled Manufacturer: Ives.

2. Requirements:
   a. Provide aluminum geared continuous hinges conforming to ANSI/BHMA A156.26, Grade 1.
   b. Provide aluminum geared continuous hinges, where specified in the hardware sets, fabricated from 6063-T6 aluminum, with 0.25-inch (6 mm) diameter Teflon coated stainless steel hinge pin.
   c. Provide split nylon bearings at each hinge knuckle for quiet, smooth, self-lubricating operation.
   d. Provide hinges capable of supporting door weights up to 450 pounds, and successfully tested for 1,500,000 cycles.
   e. On fire-rated doors, provide aluminum geared continuous hinges that are classified for use on rated doors by testing agency acceptable to authority having jurisdiction.
   f. Install hinges with fasteners supplied by manufacturer.
   g. Provide hinges 1 inch (25 mm) shorter in length than nominal height of door, unless otherwise noted or door details require shorter length and with symmetrical hole pattern.

2.5 FLUSH BOLTS
   A. Manufacturers:
      1. Scheduled Manufacturer: Ives
      2. Acceptable Manufacturers: Trimco, Rockwood
   B. Requirements:
      1. Provide automatic, constant latching, and manual flush bolts with forged bronze or stainless steel face plates, extruded brass levers, and with wrought brass guides and strikes. Provide 12 inch (305 mm) steel or brass rods at doors up to 90 inches (2286 mm) in height. For doors over 90 inches (2286 mm) in height increase top rods by 6 inches (152 mm) for each additional 6 inches (152 mm) of door height. Provide dust-proof strikes at each bottom flush bolt.

2.6 COORDINATORS
   A. Manufacturers:
      1. Scheduled Manufacturer: Ives
      2. Acceptable Manufacturers: Trimco, Rockwood
   B. Requirements:
      1. Where pairs of doors are equipped with automatic flush bolts, an astragal, or other hardware that requires synchronized closing of the doors, provide bar-type coordinating device, surface applied to underside of stop at frame head.
      2. Provide filler bar of correct length for unit to span entire width of opening, and appropriate brackets for parallel arm door closers and surface vertical rod exit device strikes. Factory-prep coordinators for vertical rod devices if required.
2.7 MORTISE LOCKS

A. Manufacturers and Products:
   1. Scheduled Manufacturer and Product: Best series keyway compatible
   2. Acceptable Manufacturers and Products: Unknown

B. Requirements:
   1. Provide mortise locks conforming to ANSI/BHMA A156.13 Series 1000, Grade 1 Operational, Grade 1 Security, and manufactured from heavy gauge steel, containing components of steel with a zinc dichromate plating for corrosion resistance. Provide lock case that is multi-function and field reversible for handing without opening case. Cylinders: Refer to “KEYING” article, herein.
   2. Indicators: Where specified, provide indicator window measuring a minimum 2 inch x 1/2 inch with 180 degree visibility. Provide messages color-coded with full text and/or symbols, as scheduled, for easy visibility.
   3. Provide locks with standard 2-3/4 inches (70 mm) backset with full 3/4 inch (19 mm) throw stainless steel mechanical anti-friction latch-bolt. Provide deadbolt with full 1 inch (25 mm) throw, constructed of stainless steel.
   4. Provide standard ASA strikes unless extended lip strikes are necessary to protect trim.
   5. Lever Trim: Solid brass, bronze, or stainless steel, cast or forged in design specified, with wrought roses and external lever spring cages. Provide thru-bolted levers with 2-piece spindles.

2.8 EXIT DEVICES

A. Manufacturer and Product:
   1. Scheduled Manufacturer: Von Duprin 98 series.

B. Manufacturers and Products:
   1. Scheduled Manufacturer: To establish standard of quality and design intent, exit device specifications have been based on Von Duprin products. Products of other manufacturers meeting or exceeding design and performance requirements specified herein will be considered for substitution subject to compliance with provisions of Division 01 Section “Product Requirements.”

C. Requirements:
   1. Provide exit devices tested to ANSI/BHMA A156.3-2014 Grade 1, UL certified to meet maximum 5 pound requirements according to the California Building Code section 11B-309.4, and UL listed for Panic Exit or Fire Exit Hardware. Cylinders: Refer to “KEYING” article, herein.
   2. Provide touchpad type exit devices, fabricated of brass, bronze, stainless steel, or aluminum, plated to standard architectural finishes to match balance of door hardware.
   3. Quiet Operation: Incorporate fluid damper or other device that eliminates noise of exit device operation.
   4. Touchpad: Extend minimum of one half of door width, but not the full length of exit device rail. Provide end-cap with two-point attachment to door. Match exit device finish, stainless steel for US26, US26D, US28, US32, and US32D finishes; and for all other finishes,
provide compatible finish to exit device. Provide compression springs in devices, latches, and outside trims or controls; tension springs prohibited.

5. Provide rim devices with a dual cylinder or inside thumb turn cylinder option with a visual security indicator that identifies the trims locked/unlocked status of the door from the inside of the room. Indicator in unlocked state presents a 1/2 inch x 1/2 inch white metal flag with black icon at top of device head. Indicator in locked state has no flag present. Provide rim devices without the dual cylinder or inside thumb turn cylinder option capable of being retrofitted with the visual security indicator.

6. Concealed Vertical Cable Exit Devices: provide cable-actuated concealed vertical latch system in two-point for non-rated or fire rated wood doors up to a 90 minute rating and less bottom latch (LBL) configuration for non-rated or fire rated wood doors up to 20 minute rating. Vertical rods not permitted.

a. Cable: Stainless steel with abrasive resistant coating. Conduit and core wire ends snap into latch and center slides without use of tools.
b. Wood Door Prep: Maximum 1 inch x 1.1875 inch x 3.875 inches top latch pocket and 1 inch x 1.1875 inch x 5 inches bottom latch pocket which does not require the use of a metal wrap or edge for non-rated or fire rated wood doors up to a 45 minute rating.
c. Latch-bolts and Blocking Cams: Manufactured from sintered metal low carbon copper-infiltrated steel, with molybdenum disulfide low friction coating.
d. Top latch-bolt: Minimum 0.38 inch (10 mm) and greater than 90 degree engagement with strike to prevent door and frame separation under high static load.
e. Bottom latch-bolt: Minimum of 0.44 inch (11 mm) engagement with strike.
f. Product Cycle Life: 1,000,000 cycles.
g. Latch Operation: Top and bottom latch operate independently of each other. Top latch fully engages top strike even when bottom latch is compromised. Separate trigger mechanisms not permitted.
h. Latch release does not require separate trigger mechanism.
i. Cable and latching system characteristics:
   1) Installed independently of exit device installation, and capable of functioning on door prior to device and trim installation.
   2) Connected to exit device at single point in steel and aluminum doors, and two points for top and bottom latches in wood doors.
   3) Bottom latch height adjusted, from single point for steel and aluminum doors and two points for wood doors, after system is installed and connected to exit device, while door is hanging
   4) Bottom latch position altered up and down minimum of 2 inches (51 mm) in steel and aluminum doors without additional adjustment. Bottom latch deadlocks in every adjustment position in wood doors.
   5) Top and bottom latches in steel and aluminum doors and top latch in wood doors may be removed while door is hanging.
   6) Top latch mounting: double or single tab mount for steel doors, face mount for aluminum doors eliminating requirement of tabs, and double tab mount for wood doors.

7. Provide exit devices with manufacturer’s approved strikes.

8. Provide exit devices cut to door width and height. Locate exit devices at height recommended by exit device manufacturer, allowable by governing building codes, and approved by Architect.

9. Mount mechanism case flush on face of doors, or provide spacers to fill gaps behind devices. Where glass trim or molding projects off face of door, provide glass bead kits.

10. Where lever handles are specified as outside trim for exit devices, provide heavy-duty lever trims with forged or cast escutcheons. Provide vandal-resistant levers that will travel to 90-degree down position when more than 35 pounds of torque are applied, and which can easily be re-set.
a. Lever Style: Match lever style of locksets.

11. Provide UL labeled fire exit hardware for fire rated openings.
12. Provide factory drilled weep holes for exit devices used in full exterior application, highly corrosive areas, and where noted in hardware sets.

2.9 CYLINDERS

A. Manufacturers:

1. Scheduled Manufacturer: Best
2. Acceptable Manufacturers: None

B. Requirements:

1. Provide cylinders/cores to match Coastside Fire Protection District's existing key system, compliant with ANSI/BHMA A156.5; latest revision, Section 12, Grade 1; permanent cylinders; cylinder face finished to match lockset, manufacturer's series as indicated. Refer to “KEYING” article, herein.
2. Replaceable Construction Cores.

   a. Provide temporary construction cores replaceable by permanent cores, furnished in accordance with the following requirements.
      1) 3 construction control keys
      2) 12 construction change (day) keys.

   b. County Fire Authority or Coastside Fire Protection District’s Representative will replace temporary construction cores with permanent cores.

2.10 KEYING

A. Provide a factory registered keying system, complying with guidelines in ANSI/BHMA A156.28, incorporating decisions made at keying conference.

B. Option for factory registered existing system: Provide cylinders/cores keyed into Coastside Fire Protection District’s existing factory registered keying system, complying with guidelines in ANSI/BHMA A156.28, incorporating decisions made at keying conference.

C. Option for non-factory existing system: Provide cylinders/cores keyed into Coastside Fire Protection District’s existing keying system managed by Coastside Fire Protection District’s locksmith, complying with guidelines in ANSI/BHMA A156.28, incorporating decisions made at keying conference. Contact:

   1. Firm Name: 
   2. Contact Person: 
   3. Telephone:

D. Requirements:

1. Provide permanent cylinders/cores keyed by the manufacturer according to the following key system.

   a. Master Keying system as directed by the Coastside Fire Protection District.
2. Forward bitting list and keys separately from cylinders, by means as directed by Coastside Fire Protection District. Failure to comply with forwarding requirements shall be cause for replacement of cylinders/cores involved at no additional cost to Coastside Fire Protection District.

3. Provide keys with the following features:
   a. Material: Nickel silver; minimum thickness of .107-inch (2.3mm)
   b. Patent Protection: Keys and blanks protected by one or more utility patent(s) until the year, 2029.

4. Identification:
   a. Mark permanent cylinders/cores and keys with applicable blind code per DHI publication “Keying Systems and Nomenclature” for identification. Blind code marks shall not include actual key cuts.
   b. Identification stamping provisions must be approved by the Architect and Coastside Fire Protection District.
   c. Stamp cylinders/cores and keys with Coastside Fire Protection District’s unique key system facility code as established by the manufacturer; key symbol and embossed or stamped with “DO NOT DUPLICATE” along with the “PATENTED” or patent number to enforce the patent protection.
   d. Failure to comply with stamping requirements shall be cause for replacement of keys involved at no additional cost to Coastside Fire Protection District.
   e. Forward permanent cylinders/cores to Coastside Fire Protection District, separately from keys, by means as directed by Coastside Fire Protection District.

5. Quantity: Furnish in the following quantities.
   a. Change (Day) Keys: 3 per cylinder/core.
   b. Permanent Control Keys: 3.

2.11 DOOR CLOSERS

A. Manufacturers and Products:

B. Requirements:
   1. Provide door closers conforming to ANSI/BHMA A156.4 Grade 1 requirements by BHMA certified independent testing laboratory. ISO 9000 certify closers. Stamp units with date of manufacture code.
   2. Provide door closers with fully hydraulic, full rack and pinion action with high strength cast iron cylinder, and full complement bearings at shaft.
   3. Cylinder Body: 1-1/2 inch (38 mm) diameter with 3/4 inch (19 mm) diameter double heat-treated pinion journal.
   4. Hydraulic Fluid: Fireproof, passing requirements of UL10C, and requiring no seasonal closer adjustment for temperatures ranging from 120 degrees F to -30 degrees F.
   5. Spring Power: Continuously adjustable over full range of closer sizes, and providing reduced opening force as required by accessibility codes and standards.
   6. Hydraulic Regulation: By tamper-proof, non-critical valves, with separate adjustment for latch speed, general speed, and back-check.
7. Provide closers with solid forged steel main arms and factory assembled heavy-duty forged forearms for parallel arm closers.
8. Pressure Relief Valve (PRV) Technology: Not permitted.
9. Finish for Closer Cylinders, Arms, Adapter Plates, and Metal Covers: Powder coating finish which has been certified to exceed 100 hours salt spray testing as described in ANSI Standard A156.4 and ASTM B117, or has special rust inhibitor (SRI).
10. Provide special templates, drop plates, mounting brackets, or adapters for arms as required for details, overhead stops, and other door hardware items interfering with closer mounting.

2.12 DOOR CLOSERS

A. Manufacturers and Products:
   1. Scheduled Manufacturer and Product: LCN 1460 series
   2. Acceptable Manufacturers and Products: Norton 8501/8501BF series, Sargent 1331 series, Yale 3501/3501BF series

B. Requirements:
   1. Provide door closers conforming to ANSI/BHMA A156.4 Grade 1 requirements by BHMA certified independent testing laboratory.
   2. Provide door closers with fully hydraulic, full rack and pinion action cylinder.
   3. Closer Body: 1-1/4 inch (32 mm) diameter, with 5/8 inch (16 mm) diameter heat-treated pinion journal.
   4. Hydraulic Fluid: Fireproof, passing requirements of UL10C, and requiring no seasonal closer adjustment for temperatures ranging from 120 degrees F to -30 degrees F.
   5. Spring Power: Continuously adjustable over full range of closer sizes, and providing reduced opening force as required by accessibility codes and standards.
   6. Hydraulic Regulation: By tamper-proof, non-critical valves, with separate adjustment for latch speed, general speed, and back-check.
   7. Pressure Relief Valve (PRV) Technology: not permitted.
   8. Provide special templates, drop plates, mounting brackets, or adapters for arms as required for details, overhead stops, and other door hardware items interfering with closer mounting.

2.13 DOOR TRIM

A. Manufacturers:
   1. Scheduled Manufacturer: Ives
   2. Acceptable Manufacturers: Trimco, Rockwood

B. Requirements:
   1. Provide push plates 4 inches (102 mm) wide by 16 inches (406 mm) high by 0.050 inch (1 mm) thick and beveled 4 edges. Where width of door stile prevents use of 4 inches (102 mm) wide plate, adjust width to fit.
   2. Provide push bars of solid bar stock, diameter and length as scheduled. Provide push bars of sufficient length to span from center to center of each stile. Where required, mount back to back with pull.
   3. Provide offset pulls of solid bar stock, diameter and length as scheduled. Where required, mount back to back with push bar.
4. Provide flush pulls as scheduled. Where required, provide back-to-back mounted model.
5. Provide pulls of solid bar stock, diameter and length as scheduled. Where required, mount back to back with push bar.
6. Provide pull plates 4 inches (102 mm) wide by 16 inches (406 mm) high by 0.050 inch (1 mm) thick, beveled 4 edges, and prepped for pull. Where width of door stile prevents use of 4 inches (102 mm) wide plate, adjust width to fit.
7. Provide wire pulls of solid bar stock, diameter and length as scheduled.
8. Provide decorative pulls as scheduled. Where required, mount back to back with pull.

2.14 PROTECTION PLATES

A. Manufacturers:
   1. Scheduled Manufacturer: Ives
   2. Acceptable Manufacturers: Trimco, Rockwood

B. Requirements:
   1. Provide kick plates, mop plates, and armor plates minimum of 0.050 inch (1 mm) thick, beveled four edges as scheduled. Furnish with sheet metal or wood screws, finished to match plates.
   2. Sizes of plates:
      a. Kick Plates: 10 inches (254 mm) high by 2 inches (51 mm) less width of door on single doors, 1 inch (25 mm) less width of door on pairs
      b. Mop Plates: 4 inches (102 mm) high by 2 inches (51 mm) less width of door on single doors, 1 inch (25 mm) less width of door on pairs
      c. Armor Plates: 36 inches (914 mm) high by 2 inches (51 mm) less width of door on single doors, 1 inch (25 mm) less width of door on pairs

2.15 OVERHEAD STOPS AND OVERHEAD STOP/HOLDERS

A. Manufacturers:
   1. Scheduled Manufacturers: Glynn-Johnson
   2. Acceptable Manufacturers: Rixson, Sargent

B. Requirements:
   1. Provide heavy duty concealed mounted overhead stop or holder as specified for exterior and interior vestibule single acting doors.
   2. Provide heavy duty concealed mounted overhead stop or holder as specified for double acting doors.
   3. Provide heavy or medium duty and concealed or surface mounted overhead stop or holder for interior doors as specified. Provide medium duty surface mounted overhead stop for interior doors and at any door that swings more than 140 degrees before striking wall, open against equipment, casework, sidelights, and where conditions do not allow wall stop or floor stop presents tripping hazard.
   4. Where overhead holders are specified provide friction type at doors without closer and positive type at doors with closer.
2.16 DOOR STOPS AND HOLDERS

A. Manufacturers:

1. Scheduled Manufacturer: Ives
2. Acceptable Manufacturers: Trimco, Rockwood

B. Provide door stops at each door leaf:

1. Provide wall stops wherever possible. Provide convex type where mortise type locks are used and concave type where cylindrical type locks are used.
2. Where a wall stop cannot be used, provide universal floor stops for low or high rise options.
3. Where wall or floor stop cannot be used, provide medium duty surface mounted overhead stop.

2.17 THRESHOLDS, SEALS, DOOR SWEEPS, AUTOMATIC DOOR BOTTOMS, AND GASKETING

A. Manufacturers:

1. Scheduled Manufacturer: Zero International
2. Acceptable Manufacturers: National Guard, Pemko

B. Requirements:

1. Provide thresholds, weather-stripping (including door sweeps, seals, and astragals) and gasketing systems (including smoke, sound, and light) as specified and per architectural details. Match finish of other items.
2. Size of thresholds:
   a. Saddle Thresholds: 1/2 inch (13 mm) high by jamb width by door width
   b. Bumper Seal Thresholds: 1/2 inch (13 mm) high by 5 inches (127 mm) wide by door width
3. Provide door sweeps, seals, astragals, and auto door bottoms only of type where resilient or flexible seal strip is easily replaceable and readily available.

2.18 SILENCERS

A. Manufacturers:

1. Scheduled Manufacturer: Ives
2. Acceptable Manufacturers: Trimco, Rockwood

B. Requirements:

1. Provide "push-in" type silencers for hollow metal or wood frames.
2. Provide one silencer per 30 inches (762 mm) of height on each single frame, and two for each pair frame.
3. Omit where gaskets/seals are specified or on aluminum door frames with integrated seals.
2.19 MAGNETIC HOLDERS

A. Manufacturers:
   1. Scheduled Manufacturer: LCN
   2. Acceptable Manufacturers: Rixson, Sargent

B. Requirements:
   1. Provide wall or floor mounted electromagnetic door release as specified with minimum of 25 pounds of holding force. Coordinate projection of holder and armature with other hardware and wall conditions to ensure that door sits parallel to wall when fully open. Connect magnetic holders on fire-rated doors into the fire control panel for fail-safe operation.

2.20 FINISHES

A. Finish: BHMA 626/652 (US26D); except:
   1. Hinges at Exterior Doors: BHMA 630 (US32D)
   2. Continuous Hinges: BHMA 630 (US32D)
   3. Continuous Hinges: BHMA 628 (US28)
   5. Protection Plates: BHMA 630 (US32D)
   6. Overhead Stops and Holders: BHMA 630 (US32D)
   7. Door Closers: Powder Coat to Match
   8. Wall Stops: BHMA 630 (US32D)
   9. Latch Protectors: BHMA 630 (US32D)
  10. Weatherstripping: Clear Anodized Aluminum
  11. Thresholds: Mill Finish Aluminum

PART 3 - EXECUTION

3.1 EXAMINATION

A. Prior to installation of hardware, examine doors and frames, with Installer present, for compliance with requirements for installation tolerances, labeled fire-rated door assembly construction, wall and floor construction, and other conditions affecting performance.

B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION

A. Mounting Heights: Mount door hardware units at heights to comply with the following, unless otherwise indicated or required to comply with governing regulations.
   2. Custom Steel Doors and Frames: HMMA 831.
B. Install each hardware item in compliance with manufacturer’s instructions and recommendations, using only fasteners provided by manufacturer.

C. Do not install surface mounted items until finishes have been completed on substrate. Protect all installed hardware during painting.

D. Set units level, plumb and true to line and location. Adjust and reinforce attachment substrate as necessary for proper installation and operation.

E. Drill and countersink units that are not factory prepared for anchorage fasteners. Space fasteners and anchors according to industry standards.

F. Install operating parts so they move freely and smoothly without binding, sticking, or excessive clearance.

G. Hinges: Install types and in quantities indicated in door hardware schedule but not fewer than quantity recommended by manufacturer for application indicated or one hinge for every 30 inches (750 mm) of door height, whichever is more stringent, unless other equivalent means of support for door, such as spring hinges or pivots, are provided.

H. Lock Cylinders: Install construction cores to secure building and areas during construction period.
   1. Replace construction cores with permanent cores as indicated in keying section.
   2. Furnish permanent cores to Coastside Fire Protection District for installation.

I. Key Control System: Tag keys and place them on markers and hooks in key control system cabinet, as determined by final keying schedule.

J. Door Closers: Mount closers on room side of corridor doors, inside of exterior doors, and stair side of stairway doors from corridors. Closers shall not be visible in corridors, lobbies and other public spaces unless approved by Architect.

K. Thresholds: Set thresholds in full bed of sealant complying with requirements specified in Division 07 Section "Joint Sealants."

L. Stops: Provide floor stops for doors unless wall or other type stops are indicated in door hardware schedule. Do not mount floor stops where they may impede traffic or present tripping hazard.

M. Perimeter Gaskets: Apply to head and jamb, forming seal between door and frame.

N. Meeting Stile Gaskets: Fasten to meeting stiles, forming seal when doors are closed.

O. Door Bottoms: Apply to bottom of door, forming seal with threshold when door is closed.

3.3 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.
1. Door Closers: Adjust sweep period to comply with accessibility requirements and requirements of authorities having jurisdiction.

B. Occupancy Adjustment: Approximately three months after date of Substantial Completion, Installer shall examine and readjust each item of door hardware, including adjusting operating forces, as necessary to ensure function of doors and door hardware.

3.4 CLEANING AND PROTECTION

A. Clean adjacent surfaces soiled by door hardware installation.

B. Clean operating items as necessary to restore proper function and finish.

C. Provide final protection and maintain conditions that ensure door hardware is without damage or deterioration at time of Substantial Completion.

3.5 DEMONSTRATION

A. Provide training for Coastside Fire Protection District’s maintenance personnel to adjust, operate, and maintain door hardware and door hardware finishes. Refer to Division 01 Section “Demonstration and Training.”

3.6 DOOR HARDWARE SCHEDULE

A. Locksets, exit devices, and other hardware items are referenced in the following hardware sets for series, type and function. Refer to the above-specifications for special features, options, cylinders/keying, and other requirements.

B. Hardware Sets:

   See following pages:

END OF SECTION
### Hardware Set 1

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By Door Manufacturer

### Hardware Set 15

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SECTION 08800

GLAZING

PART 1 - GENERAL

1.01 QUALITY ASSURANCE

A. In addition to complying with all pertinent codes and regulations, install all glass in accordance with the standards of the "Glazing Manual" and the "Glazing Sealing Systems Manual" of the Flat Glass Marketing Association (FGMA).

1.02 SUBMITTALS

A. Submit complete materials list showing all items proposed to be furnished and installed under this Section.

B. Sufficient data to demonstrate that all such materials meet or exceed the specified requirements.

1.03 PRODUCT HANDLING

A. Protection: Use all means necessary to protect the materials of this Section before, during, and after installation and to protect the work and materials of all other trades.

B. Replacements: In the event of damage, immediately make all repairs and replacements necessary at no additional cost to the Owner.

1.04 WARRANTY

A. Warranty insulating glass units against material obstruction to vision (such as dust or film formation on inner glass surface) for a 10 year period following acceptance of the work.

PART 2 - PRODUCTS

2.01 GLAZING MATERIALS

A. Primary Glass Standard: Provide primary glass which complies with ASTM C1036 and ASTM C1048 requirements, including those indicated by reference to type, class, quality, and form.

B. Clear float glass: Type I (float), quality q4 (glazing quality), class 1 (transparent).

   1. Provide with “Low E Smartsun Glass” at insulated glazing.

C. Tinted Glass: Type I, class 2 (heat absorbing and light reducing), quality q3 (glazing select).

   1. “LowE Smart Sun”, by Anderson, or equal.

D. Insulating Glass: Provide preassembled units consisting of organically sealed panes of glass enclosing a hermetically sealed dehydrated air space and complying with ASTM E 774 for performance classification indicated as well as with other requirements specified for glass characteristics, air space, sealing system, sealant, spacer material, corner design and dessicant. All insulated glass units shall be CBA rated.
1. 1 inch insulating glass tested and approved in accordance with the sealed Insulating Glass Manufacturer's Association (SIGMA) requirements.

2. Insulating glass shall be 1/4" tinted glass outboard, 1/2" airspace, and 1/4" clear glass inboard, unless noted otherwise.

3. Where indicated as 1/2" insulating units provide 1/8" tinted glass outboard, 1/4" airspace, and 1/8" clear glass inboard, unless noted otherwise.

E. Provide tempered glass where indicated or required by code.

F. Mirror Glass: ASTM C1036, Type 1, Flat, Class 1, q1 mirror select, 1/4" thick minimum with pressure sensitive adhesive coated scrim impregnated film tape safety backing.

G. Fire Rated Glass: “Pyroguard” clear glazing by Oldcastle Glass, or equal. Glazing shall be a minimum of 5/16" thick laminated glass

2.02 GLAZING COMPOUNDS AND SEALANTS

A. Use glazing compounds and preformed glazing sealants approved for the application and, except as otherwise specified, conforming to the Glazing materials portion of the FGMA Glazing Manual.

2.03 GLAZING ACCESSORIES

A. Provide all glazing accessories required to supplement those accessories which accompany the items to the glazed, and as needed to provide a complete installation, including glazing points, clips, shims, angles, beads, settling blocks, and spacer strips.

PART 3 - EXECUTION

3.01 INSPECTION

A. Examine the areas and conditions under which work of this Section will be installed. Correct conditions detrimental to the proper and timely completion of the Work. Do not proceed until unsatisfactory conditions have been corrected.

3.02 INSTALLATION

A. Insulating Glass: Comply with combined printed recommendations of insulating glass manufacturers and manufacturers of sealants, gaskets and other glazing materials, except where more stringent requirements are indicated, including those of the referenced standards.

B. Install glazing in locations indicated on drawings.

C. Fix movable items securely, or in a closed and locked position, until glazing compound has thoroughly set.

D. Glass setting:

   1. Items to be glazed shall be shop-glazed or field-glazed with glass of the quality and thickness specified.
2. Prepare surrounds and glass, unless otherwise directed, in conformance with the details and general conditions governing glazing in the FGMA Glazing Manual.

3. Mirrors: Set mirrors with adhesive, applied in accordance with manufacturer’s recommendations. Set plumb and level.

E. Fire Rated Glazing:

1. Provide in door openings and as indicated.

3.03 CLEANING

A. Prior to acceptance of the Work, thoroughly clean all glass and remove all labels, paint spots, sealants, and other defacements.

END OF SECTION
SECTION 09100
METAL SUPPORT SYSTEMS

PART 1 - GENERAL

1.01 QUALITY ASSURANCE

A. Gypsum suspended ceiling systems should be designed and constructed in accordance with CBC Standards.

B. Materials shall comply with applicable CBC standards.

1.02 SUBMITTALS

A. Submit manufacturer’s data for all products provided under this section of work.

B. Provide Shop Drawings for ceiling framing layout, indicating size, spacing, and pertinent details for proposed ceiling support system.

PART 2 - PRODUCTS

2.01 SUSPENSION SYSTEMS FOR CEILINGS

A. Gypsum Board: Specified in Section 09250.

B. Hanger Wire: Galvanized annealed steel wire, gages as indicated or specified herein.

C. Tie Wire: No. 18 and No. 16 double-annealed, copper bearing, galvanized steel wire.

D. Runner Channels: 1-1/2” channels, 1.12 lbs./ft. minimum, hot rolled.

E. Furring Channels: 7/8”, 25 gauge galvanized hat channels

2.02 WALL AND CEILING FRAMING MEMBERS

A. Ceiling Framing: 18 gage galvanized metal studs, sized as required for the spans provided.

PART 3 - EXECUTION

3.01 INSTALLATION

A. Details of Construction:

1. Gypsum board ceilings should not support materials or building components other than grills, light fixtures, small electrical conduits, small ducts and the like. All such components should be supported either directly from main runners, or by supplemental framing which is supported by main runners. No Vertical loads other than gypsum board dead load should be applied to cross-furring.

2. Vertical Support System:

a. There are many possible variations of hanger and main runner sizes and spacing listed in Table No. 47-A, and all of the combinations are acceptable. However, both...
hangers and main runners are most frequently spaced 4'-0" o.c. This is acceptable provided the following requirements are met:

1) Vertical hanger wires are No. 8 gage and galvanized; however, if ceiling is non-accessible, a No. 12 gage wire may be used.

2) Main runners are 1-1/2" channels, 1.12 lbs./ft. minimum, hot rolled.

3) Cross-furring may be 7/8", 26 gage galvanized hat channels at 24" maximum o.c.

b. The following requirements apply to all wire hanger/runner combinations:

1) Hangers should be saddle-tied around main runners to develop the full strength of the hangers.

2) Cross-furring should be saddle-tied to the main runners with one strand of No. 16 or two strands of No. 18 gage tie wire.

3) Main runners should be spliced by lapping and interlocking flanges 12" minimum and tying near each end with double loops of No. 16 gage wire.

4) Cross-furring should be spliced by lapping and interlocking the pieces 8" minimum and tying near each end with double loops of No. 16 gage wire.

B. Light Fixture Support:

1. All recessed or drop-in light fixtures should be supported directly by main runners or by supplemental framing which is supported by main runners.

2. Surface mounted fixtures should be attached to a main runner with a positive clamping device made of material with a minimum of 14 gage. No rotational spring catches will be allowed.

C. Lateral System:

1. Provide seismic brace to ceiling above. Use No. 12 gage diagonal wires spaced on an 8’ x 12’ grid and within 6'-0" of walls. Seismic brace to be located at intersection of main runner and cross-furring member. Provide connection between diagonal wires and main runner so as to prevent slipping for a 200 lbs. approximate seismic load.

   a. 8 gage (minimum) hanger wires may be used for up to and including 4'-0" x 4'-0" grid spacing along main runners. Splices will not be permitted in any hanger wires.

   b. Provide trapeze or other supplementary support members at obstructions to maintain hanger spacing. Provide additional hangers, struts or braces as required at all ceiling breaks, soffits or discontinuous areas. Hanger wires that are more than 1 in 6 out of plumb are to have counter-sloping wires.

   c. Ceiling grid members may be attached to not more than 2 adjacent walls. Ceiling grid members should be at least 1/2 inch free of other walls. If walls run diagonally to ceiling grid system runners, one end of main and cross runners should be free with a minimum of 1/2 inch clear at wall.

   d. At the perimeter of the ceiling area where main or cross runners are not connected to
the adjacent wall, provide interconnection between the runners at the free end to prevent lateral spreading. A metal strut or a 16 gage wire with a positive mechanical connection to the runner may be used.

e. Provide sets of four 8 gage splayed bracing wires oriented 90 degrees from each other at the following spacing:

1) Place sets of bracing wires at a spacing not more than 8 feet by 12 feet on center.

2) Provide bracing wires at locations not more than half the spacing given in "1" above from each perimeter wall and at the edge of vertical ceiling offsets. The slope of these wires should not exceed 45 degrees from a horizontal plane and should be taut without causing the ceiling to lift. Compression struts attached to the ceiling and the structure shall be provided at bracing points. Splices in bracing wires are not permitted.

f. Fasten hanger wires with not less than 3 tight turns. Fasten bracing wires with 4 tight turns. Make all tight turns within a distance of 1-1/2 inches. Hanger or bracing wire anchors to the structure should be installed in such a manner that the direction of the wire aligns as closely as possible with the direction of the forces acting on the wire.

g. Separate all ceiling hanging and bracing wires at least 6 inches from all unbraced ducts, pipes, conduit, etc.

3.04 CLEAN-UP AND PROTECTION

A. At all times keep the premises clean and orderly where work is being conducted.

B. Adequately protect all other work from damage due to the work of this Section.

C. Upon final completion of the work, remove all tools and equipment and unused materials and leave the work in a clean and orderly manner.

END OF SECTION
SECTION 09200
LATH AND PLASTER

PART 1 - GENERAL

1.01 QUALITY ASSURANCE

A. Codes and Reference Standards: In addition to complying with all pertinent codes and regulations, comply with the following:


2. ANSI A42.2, Specifications for Portland Cement and Portland Cement-Lime Plastering, Exterior (Stucco) and Interior.

3. ANSI A42.3, Specifications for Lathing and Furring for Portland Cement and Portland Cement-Lime Plastering, Exterior (Stucco) and Interior.


1.02 RELATED WORK

A. Porcelain tile: Section 04730.

1.03 SUBMITTALS

A. Prepare one 4’ x 8’ sample panel of color and texture specified, for approval by the Architect before starting any work.

1. Sample shall include all transitions between materials and shall include typical corner section and interface with windows. Coordinate with Section 04730.

B. Submit Manufacturer's Data for all items specified.

PART 2 - PRODUCTS

2.01 FURRING MATERIALS

A. Furring Channels: Minimum 25 gage galvanized sheet steel; 3/4 inch deep; standard width; lengths as required.

B. Resilient Channels: Minimum 25 gage galvanized sheet steel; size and lengths as required.

C. Fastening and Anchorage Devices: Approved devices of type and size to suit application and to rigidly secure furring members in place.

2.02 LATHING MATERIALS AND ACCESSORIES

A. Finishes: Manufacturer's standard steel products unless indicated as zinc alloy. Where not otherwise indicated, provide manufacturer's standard galvanized finish on steel products except as follows:

2. Exterior Exposed Plastering Accessories: Provide zinc alloy accessories for exterior work, except where fully concealed in plaster, or specified otherwise.

B. Underlayment:

1. Base Layer: Tyvek StuccoWrap, as manufactured by Dupont, or equal.
2. Outer Layer: Weather Resistant (Breathing): Type 1, Grade D (60 minute) Building Paper

C. Metal Lath:

1. Expanded Metal Lath: 3.4 lbs. per sq. yd.
2. Exterior Wall Lath: Type SF, self furring, welded, double wire type, 3/8” deep furred Stucco Netting, by K-Lath Corp. or equal.

D. Accessories: Coordinate depth of accessory with thickness of and number of coats of plaster to be applied. All exposed accessories shall be finished to match plaster color.

1. Small-Nose Corner Beads: Expanded type with 2-7/8” wide flanges, Keene, #1-X, or equal.
2. Cornerite: Manufacturer's standard preformed corner reinforcement made from 2.5 lb. per sq. yd. diamond mesh lath.
3. Exterior Casing Beads: Manufacturer's standard with expanded flange to suit application, square edged.
4. Expansion Joints: Manufacturer's standard roll-formed pair of casing beads with modified back flanges providing positive slip joint action and dust barrier, adjustable for joint width variation of 1/4” to 5/8”, Keene, #40, or equal. Provide manufacturer's standard prefabricated intersection and corner pieces. Provide with removable protective tape to keep joints clean.
5. Corner Reinforcement: Special stucco-type woven galvanized wire corner reinforcing strips.
6. Foundation Screed: Type 24-A weep screed, 26 gage.
7. Interior Corner Bead: Keene #30, or equal.
8. Window and Door Corner Reinforcing: Patches Butterfly reinforcing, 2.5 lb lath, by Cemco, or equal.

E. Anchorages: Tie wire, nails, screws and other approved metal supports, of type and size to suit application and to rigidly secure lathing materials in place; galvanized coated.

2.04 PLASTER

A. Cement for plaster shall be portland cement conforming to ASTM C150, Type I.

B. Gun plastic portland cement machine application of basecoats shall conform to ASTM C 78, Type I or II. Plasticizing agents may be added in manufacturing process not to exceed 12% of the total volume.
C. Sand used for plaster shall be clean and well graded from coarse to fine, and shall conform to ASTM C 144.

D. Water used for plaster shall be clean and free from deleterious amounts of acid, alkali, and organic materials.

E. Stucco Coat: Factory mixed and packaged and complying with the general requirements of the "Specifications and Standards of Manufactured Stucco Finishes" prepared by the Stucco Manufacturer's Association, by Omega, La Habra, Squires-Belt, Expo Stucco or equal.

F. Lime: ASTM C 206, Type S, or ASTM C 207, Type S.

G. Bonding Agent: Complying with ASTM C 932, non-oxidizing, non-crystallizing, unaffected by reapplication of moisture.

H. Stucco Base Concentrate: Parex En-Rock FR-100, or equal. Mix polymer emulsion admixture for En-Rock Type F Base to enhance curing, adhesion, freeze-thaw resistance, and workability. Utilize per manufacturer’s recommendations only.

PART 3 - EXECUTION

3.01 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 unsatisfactory conditions have been fixed.

3.02 FURRING AND LATH INSTALLATION

A. Install two layers of underlayment over all surfaces in accordance with manufacturer’s instructions.
   1. Install base layer of Tyvek Stuccowrap.
   2. Install outer layer of Grade D Building paper.

B. Erect metal furring and lath as required for cement plaster in accordance with referenced standards.
   1. Lath shall be discontinuous at all control/expansion joints.

C. Install members true to lines and levels and to provide surface flatness with maximum variation of 1/8 inch in 10 feet in any direction.

D. Provide solid backing each side of cut metal lath.

E. Wrap horizontal surfaces with additional layer of underlayment.

F. On horizontal surfaces, seal all nails penetrating backing paper with mastic.

G. Corner Reinforcement: Install corner reinforcement at all corners of windows and doors.

H. Architect shall approve lath installation prior to installation of scratch coat.
3.03 EXPANSION/CONTROL SCREEDS

A. Install expansion control joint screeds where indicated and specified herein. Provide horizontal and vertical screeds at door frame and window openings, and in field not to exceed 10 feet on center, or as shown. Limit of area shall not exceed 150 square feet. Length of panels shall not exceed 2-1/2 times the width.

B. Provide corner metal reinforcing at all corners, and metal edge screeds at all locations where plaster abuts dissimilar materials.

C. Door and Window Reinforcing: Install corner reinforcing at all doors and windows per manufacturer’s installation instructions.

3.04 PLASTERING

A. Metal Lath:

1. Scratch Coat: Completely cover mesh lath in one heavy coat approximately 3/8” thick.

2. Brown Coat: Scratch and brown to total 3/4” thickness. Brown coat shall be brought to a true even surface by rodding and floating, and left ready to receive finish coat. Brown coat shall be approved by the Architect prior to application of finish coat.

B. Curing: Cure portland cement plaster by maintaining each coat in a moist condition following application; keep enclosed and fog-spray (after initial set) as required to prevent dry-out.

1. Keep scratch coat moist for 48 hours before installation of brown coat.

2. Keep brown coat moist for 48 hours after installation and then let dry out.

3. Cure brown coat for a minimum of 10 days before installation of finish coat.

4. Cure finish coat a minimum of 14 days before application of water repellant coatings.

C. Complete all plaster work in the same plane and panel each day; do not stop short, such as at an expansion joint, etc.

D. Plaster surfaces shall be true and flat; edges straight and even. Provide temporary supplementary bracing to prevent bowing during plaster application.

E. Tolerances: Finish all plaster true and even within a tolerance of one in 500, leaving the finished surface free from tool marks and all other blemishes.

F. Cleaning Metal Accessories: Wipe all metal accessories clean after application of each coat.

G. Patching: Patch and repair all damaged plaster surfaces due to other trades, improper protection, or incomplete work of this Section.

1. Damage includes both physical and color damage.

2. Any patching or repair shall match adjacent color and texture.
3.06 CLEAN-UP AND PROTECTION

A. Keep premises clean and orderly at all times and adequately protect all other work from damage due to the work of this section.

B. Upon final completion of this work, clean off spatters, remove all tools, equipment and unused materials and cuttings. Leave the work in a clean orderly manner.

END OF SECTION
SECTION 09250

GYPSUM WALLBOARD

PART 1 - GENERAL

1.01 SUBMITTALS

A. Provide manufacturer's data for all material to be supplied under this section of work.
B. Provide certification that materials meet these specifications.
C. Provide manufacturer's printed instructions for installation of assemblies.
D. Provide samples of texture finishes for approval.

1.02 STORAGE AND HANDLING

A. Deliver materials in manufacturer's unopened containers, packages or bundles identified with manufacturer’s name, brand, type, and grade clearly marked.
B. Store in dry areas and protect from dampness and deterioration.
C. Protect ready-mixed products from freezing.
D. Protect metal products from rusting.
E. Deliver fire-rated materials bearing testing agency label and required fire classification number.

1.03 PROJECT CONDITIONS

A. Do not install wallboard products unless installation areas comply with minimum temperature and ventilation requirements recommended by manufacturer. As a minimum, provide temperatures above 50 degrees F. during and after installation.
B. Under slow drying conditions, allow additional drying time between coats of joint treatment.
C. Protect installed materials from drafts during hot, dry weather.

PART 2 - PRODUCTS

2.01 MANUFACTURERS

A. Provide gypsum wallboard materials manufactured by United States Gypsum, Georgia Pacific, or equal.
B. Gypsum Board:
   1. Standard: ASTM C 36; or Fed. Spec. SS-L-30, Type III, Grade R, Class I; 5/8 inch thick, tapered edges, ends square cut, maximum permissible lengths.
a. Seal all edges per manufacturer's recommendations.


4. Soundproof Gypsum Board materials shall be manufactured by Quiet Solution, Inc. (800-797-8159) www.quietsolution.com, or equal.
   a. Soundproof Gypsum Board: Quite Rock #525, 5/8" thick, fire rated, minimum STC rating of 51.

2.02 GYPSUM WALLBOARD ACCESSORIES

A. Provide gypsum wallboard accessories in accordance with Gypsum Association GA-216, and as shown on Drawings and specified.

B. Provide all accessories such as corner beads and edge trim as metal fabrications (26 gauge minimum).

C. Provide suspension system for applications of gypsum wallboard using the components required by Drawings, and in accordance with ASTM C 645 and Specification Section 09100.

D. Hanger Wire: Provide No. 8 pre-straightened hanger wires.

E. Furring Channels: Provide hat or z-type furring channels fabricated from minimum 25 gage galvanized steel.

F. Joint Treatment:
   1. Tape: Perforated, conforming to ASTM C 475 or Fed. Spec. SS-J-570, Type II.
   2. Compound: Powdered or ready-mixed conforming to ASTM C 475 or Fed. Spec. SS-J-570, Type I. Taping and topping joint compound or all-purpose joint compound may be used.

G. Priming Prior to Texturing: "Prep Coat Plus, By Hamilton, or equal.

H. Texturing:
   1. Wall Texturing: Provide materials manufactured by U. S. Gypsum, or equal.
   2. Ceiling Texturing: Provide materials manufactured by U. S. Gypsum, or equal.

PART 3 - EXECUTION

3.01 COORDINATION

A. Coordinate installation of bucks, anchors, blocking, electrical and mechanical work which is to be placed in or behind framing and gypsum wallboard. Allow such items to be installed after framing is completed.

   1. Contractor shall be responsible for inspection and acceptance of the wall and ceiling framing. Contractor shall verify that all framing is straight, plumb, and level, and ready for installation of gypsum wallboard. Commencement of gypsum wallboard installation indicates acceptance of framing.
3.02 GYPSUM BOARD INSTALLATION

A. Install gypsum board in accordance with Gypsum Association GA-216 recommendations.

B. Erect gypsum board in direction most practical and across studs with ends and edges occurring over continuous firm bearing.

C. Erect fire-rated assembly in accordance with UBC requirements for Fire Rated assemblies.

D. Use screws when fastening gypsum board to framing.

E. Treat cut edges and holes in moisture resistant gypsum board with sealant.

F. Place corner beads and trim/molds as shown or required. Use longest practical lengths. Place edge trim and molds where gypsum board abuts dissimilar materials and at all board terminations exposed to view. Construct reveals required by Drawings.

G. Tape, fill, and sand exposed joints, edges, corners, and openings to produce surfaces ready to receive finishes except at non-exposed-to-view conditions. Feather coats onto adjoining surfaces so that camber is maximum of 1/16 inch. Finishing of taping is not required at areas to receive tiles, and areas above exposed-to-view ceilings.

H. Remove and correct or replace defective work in a manner acceptable to the Architect.

I. Hang ceiling and soffit systems level and plumb, in true alignment with adjacent surfaces and walls. Hang in a flat plane, level to within 1/8 inch in 10 feet in any direction verified by water level or laser instrument.

J. Construct tight fitting joints in exposed ceiling members, continuously around openings and obstructions.

3.03 INSTALLATION OF SOUNDPROOF GYPSUM BOARD

A. Install in accordance with manufacturer’s installation instructions for wood framing.

1. Install acoustic sealant around panels prior to installing adjacent panel.

3.04 TILE BACKER BOARD INSTALLATION

A. Install in wet areas as indicated in accordance with manufacturer’s instructions.

3.05 TRIM

A. Apply edge casing plumb and true to all openings and exposed ends of wallboard abutting another material or as specifically detailed otherwise. Use continuous lengths where possible.

B. Apply corner bead plumb and true to all exposed exterior corners in continuous lengths whenever possible.

C. The drawings do not purport to show all locations and all requirements for metal trim in connection with the work of this Section. Carefully study the drawings and the job conditions; provide in place, all metal trim recommended by the manufacturer of the gypsum wallboard used and as required for a finished installation.

3.06 APPLICATION OF TEXTURE FINISH

A. Finish: All wall surfaces shall receive a "Level 5" finish minimum. A higher level finish is required for wall coverings as indicated.
   a. Gypsum Board shall be inspected by Architect to approve finish prior to priming.

B. Surface Preparation and Primer: Prepare and prime drywall and other surfaces in strict accordance with texture finish manufacturer's instructions prior to installing texture. Apply primer to all surfaces to receive texture finish. Primer shall be installed to prevent "Joint-Banding" from transferring through finished painting. Gypsum Board shall be inspected by Architect to approve priming prior to texture.

C. Finish Application: Mix and apply finish to drywall and other surfaces indicated to receive finish in strict accordance with manufacturer's instructions to produce a uniform texture without starved spots or other evidence of thin application, and free of application patterns.
   1. Finish shall be smooth.
   2. Gypsum Board finish shall be inspected by Architect to approve prior to painting.

D. Remove any texture droppings or overspray from door frames, windows and other adjoining work.

END OF SECTION
SECTION 09330
CERAMIC TILE

PART 1 - GENERAL

1.01 QUALITY ASSURANCE

A. Reference Standards:

1. American National Standards Institute (ANSI)
   b. A108.5-1999 Ceramic Tile Installed with Dry-Set Portland Cement Mortar or Latex-Portland Cement Mortar.
   c. ANSI A118.6-1999 Recommended Specifications for Ceramic Tile Grouts.
   d. ANSI A137.1-1999 Recommended Specifications for Ceramic Tile.
   e. ANSI A118.1: Dry-set Portland cement mortar
   f. ANSI A118.4: Latex Portland cement mortar.
   g. ANSI A118.6: Ceramic tile grouts.
   h. ANSI A137.1: Ceramic tile.


1.02 SUBMITTALS

A. Samples: Submit in duplicate.

1. Floor and Wall Tile: Three tiles per sample for each color and type.

2. Trim Shapes: Three samples of each color, type and shape.


4. Transition Strips: Three samples of each type and color selected.

B. Certificates:

1. Master Grade Certificates:
   a. Conform to ANSI A137.1.
   b. State grade, kind of tile, identification marks or tile packages, and name and location
of project.

c. Issued and signed by manufacturer when tile is shipped.

C. Manufacturer's Data: Submit manufacturer's data for all items to be supplied under this section of work.

D. Manufacturer's Instructions: Furnish manufacturer's instructions for use of mortars, adhesives, and grouts.

E. Shop Drawings: Submit shop drawings indicating tile pattern layout and layout of all expansion joints. Resubmitting copies of Architectural plans will not be acceptable.

F. Sample Panels: Provide sample panel 3 tiles wide by 3 tiles high for each wall and floor tile type, including any trim pieces. Sample shall be reviewed for tile and grout spacing, grout finish, and overall appearance. Approved tile sample shall serve as the basis for reviewing the balance of the work.

1.03 PRODUCT DELIVERY, STORAGE AND HANDLING

A. Deliver materials in manufacturer's original sealed containers.

1. Labels legible and intact identifying brand name and contents.

2. Tile cartons grade-sealed by manufacturer in accordance with ANSI A137.1.

3. Grade-seals unbroken.

4. Manufactured mortars and grouts to contain hallmarks certifying compliance with reference standards and be types recommended by tile manufacturer for application.

B. Store materials under cover in manner to prevent damage or contamination.

1.04 JOB CONDITIONS

A. Environmental:

1. Install mortar, set and grout tile when surface temperature is minimum 50°F (10°C) and rising but no more than 90°F (32°C).

2. Do not install mortar, set or grout tile when inclement weather conditions are expected within 48 hours after work is completed.

3. Protection: Protect adjoining work surfaces before tile work begins.

1.05 EXTRA STOCK

A. Provide owner with an additional five percent of each type of tile in unopened packages clearly labeled.
PART 2 - PRODUCTS

2.01 INTERIOR FLOOR TILE

A. Ceramic Shower Floor, non-slip, by DalTile, or equal. Size and colors as indicated. Provide with abrasive finish.

2.02 WALL TILE

A. Interior Wall Tile: size as indicated, gloss finish, by Spec Ceramic or equal. Sizes and colors as indicated.

1. Trim Units: Provide tile trim units to match characteristics of adjoining flat tile and to comply with the following requirements:

   a. Base: Cove.

   b. External corners: Bullnose.

   c. Wainscot Top: Bullnose.

2.03 SETTING MATERIALS

A. Portland Cement Mortar Installation Materials: Provide materials to comply with ANSI A108.1 as required for installation method designated, unless otherwise indicated.

B. Reinforcing Wire Fabric: 2” x 2” x 16/16 wire, by K-lath, or equal.

C. Metal Lath (shower walls): Expanded metal lath, 3.4 lbs. per square yard, by K-lath, or equal.

D. Thin-Set Portland Cement Mortar: Where thin-set portland cement mortar applications are indicated, use the following unless otherwise indicated:

   1. Laticrete 255, Multimax Multipurpose Thin Set Mortar, ANSI A118.4, by Laticrete International, or equal.

2.04 GROUTING MATERIALS

A. Epoxy Grout (Floor Tile): Laticrete, or equal. Proprietary two component preblended compound of portland cement, selected and graded aggregates, color pigments, resin and hardener and chemical additives gaged with latex additive to comply with manufacturer's directions. Grout shall be non-sanded. Color as indicated.

   1. All joints in floor tile shall be 1/8" unless noted otherwise.

B. Latex-Portland Cement Grout (Wall Tile): Laticrete, or equal. Proprietary preblended compound of portland cement, selected and graded aggregates, color pigments and chemical additives gaged with latex additive to comply with manufacturer's directions. Grout shall be non-sanded. Color as indicated. All materials shall be from the same manufactured batch to avoid excessive shading.

   1. Use latex additive in grout which is compatible with latex additive in latex-portland cement mortar.
2.04 MISCELLANEOUS MATERIALS

A. Sealants: Refer to Section 07920.

B. Shower Pan: Hydro Ban Waterproofing by Laticrete, or equal.

C. Ceramic Tile Backer Board: See Section 09250.

D. Transition Strip: Metal transition trim, by Schluter Systems, 1/8" thick, clear satin anodized aluminum. Contractor to use appropriate Schluter strip relative to thickness of tile.

E. Tile Cleaner: Product specifically acceptable to manufacturer of tile sealer, tile and grout manufacturer for application indicated. "Stone & Tile Stripper", By TileLab, or equal.

F. Grout Release: Glaze-N-Seal, AquaMix, or equal.

PART 3 - EXECUTION

3.01 INSPECTION

A. Examine surfaces to receive tile work and conditions under which tile will be installed. Do not proceed with tile work until surfaces and conditions comply with requirements indicated in referenced tile installation standard (ANSI AN-3 and A-3).

B. Condition of surface to receive tile:
   1. Assure that surfaces to receive tile are stable, flat, firm, dry, clean and free of oil, waxes and curing compounds or any material that would interfere with direct bonding.
   2. Protect adjacent surfaces prior to beginning tile work.

3.02 INSTALLATION, GENERAL

A. ANSI Tile Installation Standards: Comply with applicable parts of ANSI 108 series of tile installation standards included under "American National Standard Specifications for the Installation of Ceramic Tile".

B. TCNA Installation Guidelines: TCNA Handbook for Ceramic, Glass and Stone Tile Installation"; comply with TCNA installation methods indicated or, if not otherwise indicated, as applicable to installation conditions shown.

C. Extend tile work into recesses and under or behind equipment and fixtures, to form a complete covering without interruptions, except as otherwise shown. Terminate work neatly at obstructions, edges and corners without disrupting pattern or joint alignments.

D. 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 that plates, collars, or covers overlap tile.
E. Jointing Pattern: Unless otherwise shown, lay tile in grid pattern. Align joints when adjoining tiles on floor, base, walls and trim are same size. Layout tile work and center tile fields in both directions in each space or on each wall area. Adjust to minimize tile cutting. Provide uniform joint widths, unless otherwise shown.

1. Laying Out Tilework: Lay out work so that, as far as possible, no tile less than half full size occurs. For heights stated in feet and inches on the drawings, maintain full courses to produce the nearest obtainable height using standard bases and trim. Lay out tiles on walls so that fields and patterns center exactly on individual wall areas.

F. For tile mounted in sheets make joints between tile sheets same width as joints within tile sheets so that extent of each sheet is not apparent in finished work.

G. Expansion Joints: Locate expansion joints and other sealant filled joints, including control, contraction and isolation joints, where indicated, or if not indicated, at no more than 24 feet on center in each direction, and as recommended in TCNA Handbook, and approved by Architect.

1. Joints must be carried through all layers of installation materials, including tile, directly over joints in substrate. Provide additional joints in tile work to align with all structural joints in concrete slabs.

2. Where joints in slab do not correspond to joints in tile work, provide manufacturer's recommended slip sheet to bridge over joints in slab.

3. Prepare joints and apply sealants to comply with requirements of referenced standards and sealant manufacturer.

H. Grout tile to comply with referenced installation standards, using grout materials indicated.

1. Apply grout release prior to grouting in accordance with manufacturer's recommendations.

I. Mix and install proprietary components to comply with grout manufacturer's directions.

3.03 FLOOR INSTALLATION METHODS

A. Ceramic Tile: Install tile to comply with requirements indicated below for setting bed methods, TCNA installation methods related to types of subfloor construction, and grout types:

1. General

   a. All supporting surfaces shall be structurally sound, solid, stable, level, plumb, and true to a tolerance in plane of 1/8" in 8'0" for walls, 1/8" in 10'0" for floors, thin-set method, or 1/4" in 10'0", mortar bed method. They shall be clean and free of dust, oil, grease, paint, tar, wax, curing compound, primer, sealer, form release agent, laitance, loosely bonded topping, loose particles or any deleterious substance and debris which may prevent or reduce adhesion.

   b. Mechanically sand and scarify the substrate to completely remove all paint, loosely bonded topping, loose particles and construction debris.

   c. Before work commences examine the areas to be covered and report any flaw or adverse condition in writing to the Architect and to the general contractor. Do not proceed with work until surfaces and conditions comply with the requirements indicated.
3.04 WALL INSTALLATION METHODS

A. Install types of tile designated for wall applications in dry areas to comply with requirements indicated below for setting bed methods, TCNA installation methods related to types of subsurface wall conditions, and grout types:

   1. Studs, Backer Board, Interior: TCNA W244.
      a. Provide 2” wide fiber mesh tape embedded in material used to set tile, on all joints in backer board. Seal all penetrations and abutments to disimilar materials.

3.05 SHOWER TILE INSTALLATION METHODS

A. Install types of tile designated for shower applications to comply with requirements indicated below for setting bed methods, TCNA installation methods, and grout types:

   2. Grout: Latex-portland cement on walls and epoxy grout on floor.

C. Shower Pan: Install in accordance with manufacturer's installation instructions.

3.06 GROUT

A. Install grout in accordance with ANSI108.10 - 1999 and manufacturer's directions.
   1. Proper curing of grout entails covering installation with non-staining kraft paper for a period of 72 hours.

3.07 TILE AND GROUT SEALING

A. Before Grouting: Apply tile sealer to all surfaces prior to grouting to allow for easy clean-up after grouting. Apply material according to manufacturer’s recommendations.

B. After Grouting: After removing all excess residue and haze from tiles per manufacturer's
recommendations, apply tile sealer to all grout joints and complete tile surfaces per manufacturer’s recommendations.

3.08 SEALANTS

A. After curing, remove spacers, and dry and clean all joints requiring caulking. Prime all joints to be caulked with primer recommended by the manufacturer of the caulking. Caulking shall be expertly applied, beaded smooth and concave, without protruding beyond adjacent surfaces. Caulking shall match color of grout in adjacent joints.

3.09 CLEANING AND PROTECTION

A. Cleaning: Upon completion of placement and grouting, clean all ceramic tile surfaces in accordance with manufacturer’s recommendations so they are free of foreign matter. Polish tiles with dry, clean cloth (cheese cloth is recommended.)

B. Unglazed tile shall be cleaned with acid solutions when permitted by tile and grout manufacturer's printed instructions, but no sooner than 14 days after installation. Protect metal surfaces, cast iron and vitreous plumbing fixtures from effects of acid cleaning. Flush surface with clean water before and after cleaning.

C. Finished Tile Work: Leave finished installation clean and free of cracked, chipped, broken, unbonded, or otherwise defective tile work.

D. Protection: Apply a protective coat of neutral protective cleaner to completed tile walls and floors. Protect installed tile work with Kraft paper or other heavy covering during construction period to prevent staining, damage and wear.

E. Prohibit foot and wheel traffic from using tiled floors for at least 7 days after grouting is completed.

F. Before final inspection, remove protective coverings and rinse neutral cleaner from tile surfaces.

END OF SECTION
PART 1 - GENERAL

1.01 QUALITY ASSURANCE

A. Regulatory Requirements: Comply with applicable provisions of the following codes and standards, unless modified by the specifications or drawings.

2. ASTM C 635 - Metal Suspension Systems for Acoustical Tile and Lay-In Panel Ceilings.
3. ASTM C 636 - Installation of Metal Ceiling Suspension Systems for Acoustical Tile and Lay-In Paneling.

1.02 SUBMITTALS

A. Submit shop drawings indicating grid layout, related dimensioning, junctions with other work or ceiling finishes, and interrelation of mechanical and electrical systems.

1. Reproduction of contract drawings as the basis of shop drawings for the work of this section is not acceptable.
2. Field check existing walls and ceiling conditions before making layout so that shop drawings reflect the existing conditions.

B. Submit product data, specifications, and manufacturer's installation instructions.

C. Submit samples as follows:

1. 12-inch long samples of main tees, cross tees and perimeter molding.
2. Full sized samples of each type acoustical board and tile used in the work.

D. Extra Stock: Provide Owner with an additional five percent of each type of acoustic panel and tile and ceiling grid in unbroken packages for use in repairs or replacements.

1.03 ENVIRONMENTAL REQUIREMENTS

A. Do not install acoustical ceilings until building is enclosed, sufficient heat is provided, dust generating activities have terminated and overhead mechanical work is completed, tested and approved.

B. Permit wet work to dry prior to commencement of installation.

C. Maintain uniform temperatures of minimum (60°C) and humidity of 20 percent to 40 percent prior to, during and after installation.
PART 2 - PRODUCTS

2.01 MATERIALS

A. Suspension System:
   1. Manufacturers: Donn Products, Chicago Metallic Corp., or equal, conforming to ASTM C 635, heavy duty system, sized to fit specified tile.
   2. Grid: Non-fire rated exposed T, all components die cut and interlocking, Donn "Centricitee" 9/16" Exposed Tee System, to be compatible with specified ceiling tile, or equal.
   3. Accessories: Stabilizer bars, furring clips, splices, and edge moldings as required to complete and complement suspended ceiling grid system.
   4. Materials/Finish: Commercial quality cold rolled steel with galvanized coating; white baked-on vinyl finish on exposed surfaces.
   5. Carrying Channels and Hangers: Galvanized steel; size and type to suit application and to rigidly secure the complete acoustic unit ceiling system, with maximum deflection of 1/360.

B. Acoustical Panels: "Dune", 24" x 24" x 5/8", beveled tegular edge, by Armstrong World Industries, or equal. Color shall be white.

PART 3 - EXECUTION

3.01 INSTALLATION

A. Install acoustical ceiling systems in accordance with UBC Standard 47-18 and ASTM C 363 to produce finished ceiling true to lines and levels and free from warped, soiled or damaged grid or lay-in panels.

B. Provide all necessary bracing to comply with requirements for lateral resistance.

C. Install ceiling systems in a manner capable of supporting all superimposed loads, with maximum permissible deflection of 1/360 of span and maximum surface deviation of 1/8 inch in 10 ft (1/960).

D. Install after major above-ceiling work is complete. Coordinate the location of hangers with other work. Ensure the layout of hangers and carrying channels are located to accommodate fittings and units of equipment which are to be placed after the installation of ceiling grid systems.

E. Where ducts or other equipment prevent the regular spacing of hangers, reinforce the nearest adjacent hangers and related carrying channels as required to span the required distance.

F. Supply hangers or inserts for installation to the respective section in ample time and with clear instructions for their correct placement. Provide additional hangers and inserts as required.

G. Hang independently of walls, columns, ducts, pipes and conduit. Where carrying members are spliced, avoid visible displacement of the longitudinal axis or face plane of adjacent members.

H. Center ceiling systems on room axis leaving equal border pieces.
I. Do not support fixtures from or on main runners or cross runners if weight of the fixture causes the total dead load to exceed the deflection capability. In such cases, support fixture loads by supplementary hangers located within 6 inches of each corner, or support the fixtures independently.

J. Do not install fixtures so that main runners and cross runners will be eccentrically loaded. Where fixture installation would produce rotation of runners, provide stabilizer bars.

K. Install edge moldings at intersection of ceiling and vertical surfaces, using maximum lengths, straight, true to line and level. Miter corners. Provide edge moldings at junctions with other ceiling finishes.

L. Fit acoustic lay-in panels in place, free from damaged edges or other defects detrimental to appearance and function. Fit border units neatly against abutting surfaces.

M. Install lay-in panels level, in uniform plane and free from twist, warp and dents.

3.02 ADJUSTMENTS AND CLEANING

A. Adjust any sags or twists which develop in the ceiling systems and replace any part which is damaged or faulty.

B. Clean exposed surfaces of acoustical ceilings, including trim, edge moldings, and suspension members; comply with manufacturer's instructions for cleaning and touch-up of minor finish damage. Remove and replace work which cannot be successfully cleaned and repaired to permanently eliminate evidence of damage.

END OF SECTION
SECTION 09650
RESILIENT FLOORING

PART 1 - GENERAL

1.01 SUBMITTALS

A. Submit complete list of all materials included in this Section.

B. Submit samples of each item and color available in the specified products from the proposed manufacturer.

C. Extra Stock: Provide Owner with an additional five percent of each type of specified product in unopened packages for use in repairs or replacements. The cost of this material shall be included in the Contractor's bid or the contract price.

D. The VOC content of adhesives and sealants used must be less than the current VOC content limits of the South Coast Air Quality Management District (SCAQMD) Rule #1168, AND all sealants used as fillers must meet or exceed the requirements of the Bay Area Air Quality Management District Regulation 8, Rule 51.

1.02 PRODUCT HANDLING

A. Delivery and Storage: Deliver materials to the job site and store in their original unopened containers with all labels intact and legible at time of use. Store in strict accordance with the manufacturers' recommendations.

B. Protection: Use all means necessary to protect materials of this Section before, during and after installation and to protect installed work and materials of all other trades.

C. Replacements: In the event of damage, immediately make all repairs and replacements necessary and at no additional cost to the Owner.

PART 2 - PRODUCTS

2.01 MATERIALS

A. Adhesives: As recommended by manufacturer which comply with the VOC limits noted above.

B. Edging strips: Rubber transition strip as indicated. Color as indicated or as selected by Architect from manufacturer's standard colors.

C. Base: Topset (cove) 4" high rubber base, by Roppe, Burke, or equal. Color as indicated.


1. Prefabricated athletic rubber flooring, calandered and vulcanized with a base of natural and synthetic rubber, stabilizing agents and pigmentation, as manufactured by MONDO AMERICA INC. or approved equal.

2. Thickness: 3/8” (10mm)
3. Color shall be as indicated.


5. Manufactured in two layers, which are vulcanised together. The shore hardness of the top layer will be greater than that of the bottom layer; shore hardness of layers to be recommended by the manufacturer and the limits specified.

E. Floor Patching Compound/Underlayment: Latex type as recommended by the flooring manufacturer.

F. Crack Filler: For concrete floor surfaces us non-shrinking cement mortar as recommended by flooring manufacturer.

G. Moisture Sealer: As recommended by manufacturers of flooring materials and selected by Installer to meet project circumstance and requirements where moisture content exceeds manufacturer’s allowable limits. Cost of required sealer shall be included in the contractor’s bid.

1. Sealer must comply with VOC limits noted above.

2.02 OTHER MATERIALS

A. All other materials, not specifically described but required for a complete and proper installation of the work of this Section, shall be as recommended by the manufacturer of the resilient materials used.

PART 3 - EXECUTION

3.01 INSPECTION

A. Examine the areas and conditions under which resilient flooring is to be placed. Correct conditions detrimental to the proper and timely completion of the Work. Do not proceed until unsatisfactory conditions have been corrected.

B. Surface shall be smooth, level, at the required finish elevation, without more than 1/8" in 10'-0" variation from level or slopes shown.

C. Alkalinity test and moisture test must be preformed. PH level should be in the range of 7 to 8.5. Moisture content must not exceed manufacturer’s recommendations (verify using the calcium chloride test as per ASTM F 1869).

1. Where test results exceed manufacturer’s recommended limits apply sealer as specified.

3.02 PREPARATION

A. Subfloors: Prior to start of laying flooring, broom clean or vacuum all surfaces to be covered and inspect the subfloors. Start of installation will indicate acceptance of subfloor conditions.

1. Install crack filler and floor patching compound as required to provide smooth subfloor prior to application of flooring.

B. Concrete Primer: Apply concrete slab primer if recommended by flooring manufacturer, prior to application of the adhesive. Apply in compliance with manufacturer’s directions.
3.03 RUBBER MAT INSTALLATION

A. Clean substrate. Spread two-part epoxy adhesive evenly in quantity recommended by manufacturer to ensure adhesion over entire area. Spread only enough adhesive to permit installation of flooring before initial set.

B. Set flooring in place per manufacturer’s recommendations, press with heavy roller to ensure full adhesion.

C. Hold all seams in place with suitable weights (concrete utility bricks 2 x 4 x 8) for a minimum of 12 hrs.

D. Lay flooring with joints and seams parallel to building lines.

E. Terminate flooring at centerline of door openings where adjacent floor finish is dissimilar.

F. Install edge strips at unprotected or exposed edges where flooring terminates and as indicated.

G. Scribe flooring to walls, columns, cabinets, floor outlets and other appurtenances to produce tight joints.

H. Install material for wall installation in similar manner and as recommended by the manufacturer.

3.04 BASE INSTALLATION

A. Fit joints tight and vertical. Maintain minimum measurement of 18” between joints.

B. Miter internal corners. Use pre-molded sections for external corners and exposed ends.

C. Install base on solid backing. Adhere tightly to wall and floor surface.

D. Scribe and fit to door frames and other obstructions.

E. Install straight and level to variation of plus or minus 1/8 inch over 10 feet (1/960).

F. No gaping of material will be permitted. Base must be completely adhered to wall material.

3.05 CLEANING AND PROTECTION

A. Remove excess adhesive or other surface blemishes from flooring, using neutral type cleaners recommended by the flooring manufacturer. Protect installed flooring from damage until acceptance by the Owner.

3.06 FINISHING

A. After completion of the Work and just prior to final inspection, thoroughly clean resilient flooring and accessories. Apply wax and buff vinyl composition tile, with the type of wax, number of coats, and buffing procedures recommended by the flooring manufacturer.

END OF SECTION
SECTION 09680
CARPET TILE

PART 1 - GENERAL

1.01 QUALITY ASSURANCE

A. For the purpose of establishing quality and quantity of required materials, the standard specifications of the indicated manufacturer’s have been cited herein except as modified. Products of other manufacturers may be proposed, provided that the material is an exact match. Substitution of other manufacturer's products shall be as specified in Section 01630.

1.02 SUBMITTALS

A. Samples:

1. Submit three samples of each carpet to be used, sufficiently sized to clearly indicate construction.

2. Submit samples of transition strips in manufacturer’s standard colors for selection.

B. Submit shop drawings clearly indicating the location of areas to be carpeted, details of special treatments such as ramps, method of integrating edge strips with carpet and installation procedures.

C. Submit product data for miscellaneous materials to be used in installation, including floor leveling material, adhesives, transition strips, etc.

D. Quality Assurance: Submit certificates from the installation contractor, attesting that the installation supervisor has had a minimum of five years experience in this type of work and will provide qualified, experienced installers to perform work. Include a list of previous jobs giving name, location, dollar value, and date, setting forth supervisor's experience.

E. The VOC content of adhesives and sealants used must be less than the current VOC content limits of the South Coast Air Quality Management District (SCAQMD) Rule #1168, AND all sealants used as fillers must meet or exceed the requirements of the Bay Area Air Quality Management District Regulation 8, Rule 51.

1.02 ENVIRONMENTAL REQUIREMENTS

A. Do not commence with carpet installation until painting and finishing work is complete and ceilings and overhead work, tested, approved and completed.

B. Maintain room temperature at minimum 60 degrees F (15 degrees C) for at least 24 hours prior to installation and relative humidity at approximately that at which the area is to be maintained.

C. Provide sufficient lighting.

1.03 REGULATORY REQUIREMENTS

A. Carpet shall bear the Carpet and Rug Institute (CRI) Indoor Air Quality (IAQ) label. Carpet type bearing the label will indicate that the carpet has been tested and meets the criteria of the CRI Green Label requirements for indoor air quality Test Criteria.
1.04 ADDITIONAL STOCK:
   A. Provide two cartons of additional carpet tile for each carpet indicated.

PART 2 - PRODUCTS

2.01 MATERIALS
   A. Carpet (CPT-1): Mohawk or equal, modular carpet tile, size style and color as indicated:
   B. Carpet (CPT-2): Milliken, modular carpet tile, color as indicated, as follows:
   C. Carpet Edge Guard: Rubber transition strip or Schluter Strip as indicated. Color as selected by
      Architect from manufacturer's standard colors.
   D. Installation Adhesive: Water-resistant, non-staining type as recommended by carpet or cushion
      manufacturer, and which complies with flammability requirements for installed carpet. Adhesives
      must comply with the VOC limits noted above.
   E. Seaming Cement: Hot-melt seaming adhesive or similar product recommended by carpet
      manufacturer, for taping seams and buttering cut edges at backing to form secure seams and
      prevent pile loss at seams.
   F. Floor Patching Compound/Underlayment: Latex type as recommended by the flooring
      manufacturer.
   G. Crack Filler: For concrete floor surfaces us non-shrinking cement mortar as recommended by
      flooring manufacturer.
   H. Moisture Sealer: As recommended by manufacturers of carpet and selected by Installer to meet
      project circumstance and requirements where moisture content exceeds manufacturer=s allowable
      limits. Cost of required sealer shall be included in the contractor's bid.
      1. Sealer must comply with VOC limits noted above.
   I. Miscellaneous Materials: As recommended by manufacturers of carpet, cushions and other
      carpeting products; and selected by Installer to meet project circumstance and requirements.

PART 3 - EXECUTION

3.01 PRE-INSTALLATION REQUIREMENTS
   A. Examine substrates for moisture content and other conditions under which carpeting is to be
      installed. Repair minor holes, cracks, depressions or rough areas using material recommended by
      carpet or adhesive manufacturer. Notify Contractor in writing of major conditions detrimental to
      proper completion of the work. Do not proceed until unsatisfactory conditions have been corrected.
      1. Where test results exceed manufacturer=s recommended moisture limits apply sealer as
         specified.
      2. Install crack filler and floor patching compound as required to provide smooth subfloor prior to
application of flooring.

B. Clear away debris and scrape up cementitious deposits from surfaces to receive carpeting; vacuum clean immediately before installation. Check concrete surfaces to ensure no "dusting" through installed carpet; apply sealer where required to prevent dusting.

C. Sequence carpeting with other work so as to minimize possibility of damage and soiling of carpet during remainder of construction period.

D. Verify moisture content of floor. Where moisture content exceeds manufacturer’s recommendations install sealer in accordance with installation instructions. Do not proceed with installation of carpet until subfloor has been approved by carpet manufacturer’s representative.

1. Where test results exceed manufacturer’s recommended limits apply sealer per sealer manufacturer’s recommendations.

3.02 INSTALLATION

A. Comply with manufacturers’ instructions and recommendations for seam locations and direction of carpet; maintain uniformity of carpet direction and lay of pile. At doors, center seams under doors; do not place seams in traffic direction at doorways.

B. Extend carpet under open-bottomed obstructions and under removable flanges and furnishings, and into alcoves and closets of each space.

C. Provide cut-outs where required, and bind cut edges properly where not concealed by protective edge guards or overlapping flanges.

D. Install carpet edge guard where edge of carpet is exposed; anchor guards to substrate.

E. Glue-Down Installation:

1. Fit sections of carpet into each space prior to application of adhesive. Trim edges and butter cuts with seaming cement.

2. Apply adhesive uniformly to substrate in accordance with manufacturer’s instructions. Butt carpet edges tightly together to form seams without gaps. Roll entire carpet lightly to eliminate air pockets and ensure uniform bond. Remove adhesive promptly from face of carpet.

F. Material Transition: Float concrete slab at material changes to provide smooth transition between materials. Extend float material a minimum of 4’ beyond transition edge. In locations with multiple transitions float entire floor area as required to minimize changes in elevation.

3.03 CLEANING AND PROTECTION

A. Remove and dispose of debris and unusable scraps.

B. Vacuum carpet using commercial machine with face-beater element. Remove spots and replace carpet where spots cannot be removed. Remove any protruding face yarn using sharp scissors.

C. Advise Contractor of protection methods and materials needed to ensure that carpeting will be without deterioration or damage at time of substantial completion.
D. Maintenance Materials: Deliver additional carpet tiles to Owner's designated storage space, properly packaged (paper wrapped) and identified.

END OF SECTION
SECTION 09900

EXTERIOR PAINTING

PART 1 – GENERAL

1.01 DESCRIPTION

A. Extent of painting work is indicated on drawings and schedules, and as herein specified.

B. Work includes painting and finishing of interior and exterior exposed items and surfaces throughout project, except as otherwise indicated.

C. Surface preparation, priming and coats of paint specified are in addition to shop-priming and surface treatment specified under other sections of work.

D. Work includes field painting of exposed bare and covered pipes and ducts (including color coding), and of hangers, exposed steel and iron work, and primed metal surfaces of equipment installed under mechanical and electrical work, except as otherwise indicated.

E. "Paint" as used herein means all coating systems materials, including primers, emulsions, enamels, stains, sealers and fillers, and other applied materials whether used as prime, intermediate or finish coats.

F. Surfaces to be Painted: Except where natural finish of material is specifically noted as a surface not to be painted, paint exposed surfaces whether or not colors are designated in "schedules". Where items or surfaces are not specifically mentioned, paint the same as similar adjacent materials or areas. If color or finish is not designated, Architect will select these from standard colors or finishes available.

G. Following categories of work are not included as part of field-applied finish work.

1. Pre-Finished Items: Unless otherwise indicated, do not include painting when factory-finishing or installer-finishing is specified for such items.

2. Concealed Surfaces: Unless otherwise indicated, painting is not required on surfaces such as walls or ceilings in concealed areas and generally inaccessible areas, foundation spaces, furred areas, pipe spaces, and shafts.

3. Finished Metal Surfaces: Unless otherwise indicated, metal surfaces of anodized aluminum, stainless steel, chromium plate, copper, bronze and similar finished materials will not require finish painting.

4. Operating Parts: Unless otherwise indicated, moving parts of operating units, mechanical and electrical parts, such as valve and damper operators, linkages, sinkages, sensing devices, motor and fan shafts will not require finish painting.

H. Following categories of work are included under other sections of these specifications:
1. Shop Priming: Unless otherwise specified, shop priming of ferrous metal items is included under various sections for structural steel, metal fabrication, metal doors and frames, and similar items.

2. Unless otherwise specified, shop priming of fabricated components such as architectural woodwork, wood casework, and shop-fabricated or factory-built mechanical and electrical equipment or accessories is included under other sections of these specifications.

3. Mechanical and Electrical Work: Painting of mechanical and electrical work is specified in Division 15 and 16, respectively.

I. Do not paint over any code-required labels, such as Underwriters' Laboratories and Factory Mutual, or any equipment identification, performance rating, name, or nomenclature plates.

1.02 QUALITY ASSURANCE

A. Single Source Responsibility: Provide primers and other undercoat paint produced by same manufacturer as finish coats. Use only thinners approved by paint manufacturer, and use only within recommended limits.

B. Coordination of Work: Review other sections of these specifications in which prime paints are to be provided to ensure compatibility of total coatings system for various substrates. Upon request from other trades, furnish information or characteristics of finish materials provided for use, to ensure compatible prime coats are used.

1.03 SUBMITTALS

A. Manufacturer's Data:

1. Complete materials list of all items proposed to be furnished and installed under this Section.

2. Manufacturers’ specifications and other data required to demonstrate compliance with the specified requirements.

3. For information only, submit two copies of manufacturer's specifications and application instructions for each material.

4. The VOC content of interior paint materials used must be less than the current VOC content limits of the South Coast Air Quality Management District (SCAQMD) Rule #1168, AND all sealants used as fillers must meet or exceed the requirements of the Bay Area Air Quality Management District Regulation 8, Rule 51. Submit data indicating VOC content of each material proposed for use.

B. Samples: Following the selection of colors and glosses by the Architect, submit samples for the Architect's review of color and texture only. Provide a listing of material and application for each coat of each finish sample.

1. Submit six draw-down samples of each paint color and gloss type indicated.

   a. Stain samples shall be submitted on samples of actual wood type being used on project.

1.04 PRODUCT HANDLING
A. Deliver all materials to the job site in original, new, and unopened containers bearing the manufacturer's name and label.

B. Provide proper storage to prevent damage to, and deterioration of, paint materials.

C. Use all means necessary to protect the materials of this Section before, during, and after installation and to protect the work and materials of all other trades.

D. In the event of damage, immediately make all repairs and replacements necessary to the approval of the Architect and at no additional cost to the Owner.

1.05 JOB CONDITIONS

A. Surface Temperatures: Do not apply solvent-thinned paints when the temperature of surfaces to be painted and the surrounding air temperature are below 45 degrees F, unless otherwise permitted by the manufacturer's printed instructions.

B. Weather Conditions: Do not apply paint in rain, fog, or mist; or when the relative humidity exceeds 85%; or to damp or wet surfaces; unless otherwise permitted by the manufacturer's printed instructions. Applications may be continued during inclement weather within the temperature limits specified by the paint manufacturer during application and drying periods.

1.06 REGULATORY REQUIREMENTS

A. All material and application of material shall comply with all air pollution control regulations.

1.07 EXTRA STOCK

A. Amount: Upon completion of the work of this Section, deliver to the Owner an extra stock equaling 10% of each color, type, and gloss of paint used on the Work, but not more than five gallons for each.

B. Packaging: Tightly seal each container and clearly label with the contents and location used.

1.08 GUARANTEE

A. Guarantee the painting work, in writing, against peeling, fading, cracking, blistering, or crazing for a period of three years from the time the Notice of Completion is filed.

PART 2 - PRODUCTS

2.01 MATERIALS

A. Principal paint materials, unless otherwise indicated, shall be as manufactured by Sherwin-Williams, Dunn-Edwards Corp., or equal.

B. Colors and Glosses: The Architect will select colors to be used in the various types of paint specified and indicated and will be the sole judge of acceptability of the various glosses obtained from the materials proposed to be used in the Work.

C. Undercoats and Thinners: Provide undercoat paint produced by the same manufacturer as the finish coat. Use only the thinners recommended by the paint manufacturer, and use only to the
recommenced limits. Insofar as practicable, use undercoat, finish coat, and thinner material as parts of a unified system of paint finish.

2.02 APPLICATION EQUIPMENT

A. For application of the approved paint, use only such equipment as is recommended for application of the particular paint by the manufacturer of the particular paint.

B. Compatibility: Prior to actual use of application equipment, use all means necessary to verify that the proposed equipment is actually compatible with the material to be applied and that the integrity of the finish will not be jeopardized by use of the proposed application equipment.

2.03 OTHER MATERIALS

A. All other materials, not specifically described but required for a complete and proper installation of the work of this Section, shall be new first-quality of their respective kinds, and as selected by the Contractor subject to the approval of the Architect.

PART 3 - EXECUTION

3.01 SURFACE CONDITIONS

A. Inspection: Prior to installation of the work of this Section, carefully inspect the installed work of all other trades and verify that all such work is complete to the point where this installation may properly commence. Verify that painting may be completed in strict accordance with the original design and with the manufacturer’s recommendations.

B. Discrepancies: Do not proceed in areas of discrepancy until all such discrepancies have been fully resolved.

3.02 MATERIALS PREPARATION

A. Mix and prepare painting materials in strict accordance with the manufacturer’s recommendations.

B. Store materials not in actual use in tightly covered containers.

C. Maintain containers used in storage, mixing, and application of paint in a clean condition, free from foreign materials and residue.

D. Stirring: Stir all materials before application to produce a mixture of uniform density, and as required during the application of materials. Do not stir into the material any film which may form on the surface. Remove the film and, if necessary, strain the material before using.

3.03 SURFACE PREPARATION

A. Perform all preparation and cleaning procedures in strict accordance with the paint manufacturer’s recommendations.

B. Remove all removable items which are in place and are not scheduled to receive paint finish, or provide surface-applied protection prior to surface preparation and painting operations.

C. Following completion of painting in each space or area, reinstall the removed items by using workmen skilled in the necessary trades.
D. Clean each surface to be painted prior to applying paint or surface treatment.

E. Remove oil and grease with clean cloths and cleaning solvents of low toxicity and a flash point in excess of 100 degrees F, (38 degrees C) prior to start of mechanical cleaning.

F. Schedule the cleaning and painting so that dust and other contaminants from the cleaning process will not fall onto wet newly painted surfaces.

G. Preparation of Metal Surfaces:
   1. Thoroughly clean all surfaces until they are completely free from dirt, oil, and grease. Clean cutting oil from exposed pipes.
   2. On galvanized surfaces, use solvent for the initial cleaning and then treat the surface thoroughly with phosphoric acid etch. Remove all etching solution before proceeding.
   3. Allow to dry thoroughly before application of paint.
   4. Apply primer the same day pretreatment is applied.

3.04 PAINT APPLICATION

A. On all removable panels and all hinged panels, paint the back sides to match the exposed sides.

B. Apply one heavy coat of flat black paint on all construction visible through screen vents and grilles.

C. Drying: Allow sufficient drying time between coats. Modify the period as recommended by the material manufacturer to suit adverse weather conditions.

D. Brush and Roller Application: Apply all coats onto the surfaces in an even film. Cloudiness, spotting, holidays, laps, brush or roller marks, runs, sags, ropiness, and other surface imperfections will not be acceptable.

E. Spray Application: Wherever spray application is used, apply each coat to provide the equivalent hiding of brush-applied coats. Do not double back with spray equipment for the purpose of building up film thickness of two coats in one pass.
   1. Backroll all sprayed surfaces to provide uniform finish appearance.

F. Completed work shall match the approved Samples for color, texture, and coverage. Remove, refinish, or repaint all work not in compliance with specified requirements.
3.05  PAINTING SCHEDULE - EXTERIOR

Sherwin Williams  Dunn-Edwards

A.  Ferrous Metal - Gloss:

1st Coat:  Controls Rust Primer  43-4 Bloc-Rust  
           B49WJ900

2nd Coat:  Controls Rust Enamel  Syn-lustro #10  
           B35WJ951

3rd Coat:  Controls Rust Enamel  Syn-lustro #10  
           B35WJ950

B.  Non-Ferrous Metal - Gloss:

Pretreatment  SSPC SP-1  GE123Galv-Etch

1st Coat:  DTM Wash Primer  43-7  
           B71Y1  Galv. Alum.

2nd Coat:  DTM Acrylic Gloss  W960  
           B66-100  Permagloss

3rd Coat:  DTM Acrylic Gloss  W960  
           B66-100  Permagloss

C.  Wood and Cement Treated Fiber board - paint:

1st Coat:  PrepRite Problock  E-Z Prime  
           B51W20  W708

2nd Coat:  Solo Acrylic Gloss  Permagloss  
           B21WJ8651  W960

3rd Coat:  Solo Acrylic Gloss  Permagloss  
           B21WJ8651  W960
3.07 PAINTING SCHEDULE - INTERIOR

A. Finish - Eggshell Wall Paint:

1. Gypsum Board:

   1st Coat: Promar High Holdout W600
              Primer B28WY2000 Ecoshield Primer
   2nd Coat: ProGreen 200 W602
              Eggshell B20W651 Ecoshield Low Sheen
   3rd Coat: ProGreen 200 W602
              Eggshell B20W651 Ecoshield Low Sheen

2. Metal, Ferrous:

   1st Coat: Pro-Cryl Universal Metal 43-5
              Primer B66-310 Corrobar
   2nd Coat: ProGreen 200 W602
              Eggshell B20W651 Ecoshield Low Sheen
   3rd Coat: ProGreen 200 W602
              Eggshell B20W651 Ecoshield Low Sheen

3. Metal - Non-Ferrous:

   Pretreatment: Pro-Cryl Universal Metal W 600
                 Primer B66-310 Ecoshield Primer
   2nd Coat: ProGreen 200 W602
              Eggshell B20W651 Ecoshield Low Sheen
   3rd Coat: ProGreen 200 W602
              Eggshell B20W651 Ecoshield Low Sheen

B. Finish - Semi-Gloss Paint:

1. Gypsum Board:

   1st Coat: Promar High Holdout W600
              Primer B28WY2000 Ecoshield Primer
   2nd Coat: ProGreen 200 W603
              Semigloss B31W651 Ecoshield Semigloss
   3rd Coat: ProGreen 200 W603
              Semigloss B31W651 Ecoshield Semigloss

2. Wood:

   1st Coat: PrepRite Problock W600
              B51W20 Ecoshield Primer
   2nd Coat: Solo Acrylic Semigloss W901V
              B31WJ8651 Permasheen Semigloss
   3rd Coat: Solo Acrylic Semigloss W901V
              B31WJ8651 Permasheen Semigloss
3. Metal, Ferrous:

1st Coat: ProCryl Primer 43-5
B66-310 Corrobar
2nd Coat: Solo Acrylic Semigloss W901V
B31WJ8651 Permasheen Semiglos
3rd Coat: Solo Acrylic Semigloss W901V
B31WJ8651 Permasheen Semiglos

4. Metal, Non-Ferrous:

Pretreatment ProCryl Primer W2400 Latex
B66-310 Enamel Undercoater
2nd Coat: Solo Acrylic Semigloss W901V
B31WJ8651 Permasheen Semiglos
3rd Coat: Solo Acrylic Semigloss W901V
B31WJ8651 Permasheen Semiglos

D. Wood - Stain and Lacquer (Shop Finish):

1. Stain: Wood Classics Wood Stain Valsper Wiping Stain
A49 series
2. Sealer: Woodclassics Waterbone Polyurethane Varnish Lacquer Sanding Sealer
V-NRS1620-1
3. Two coats: Woodclassics Waterbone NAF1626
Polyurethane Varnish LusterLac

END OF SECTION
SECTION 09950

FIBER REINFORCED PLASTIC COATED PANELS

PART 1 - GENERAL

A. Division 1 Requirements & General Conditions are a part of this section.

1.01 QUALITY ASSURANCE

A. Furnish all labor, materials, services, testing, transportation and equipment necessary for and reasonably incidental to the completion of all work of this section, as indicated on drawings and specified herein. Work, materials and equipment not indicated or specified which is necessary for a 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.

1.02 SUBMITTALS

A. Product Data and Certification: Submit manufacturer's technical data and installation instructions for each type of wall covering and installation materials. Submit manufacturer's Certification that products intended for installation meet the specification requirements.

B. Samples: Submit samples of manufacturer's standard colors for selection.

1.03 DELIVERY AND STORAGE

A. Comply with instructions and recommendations of manufacturer and as herein specified.

B. Deliver materials to project site in original packages or containers clearly labeled to identify manufacturer, brand name, quality or grade, and fire hazard classification.

C. Store materials in original undamaged packages or containers. Do not store rolled goods in upright position. Maintain temperature in storage area above 40°F (4°C).

PART 2 - PRODUCTS

2.01 MATERIALS

A. Wall Panels: 4' wide panels of fiberglass reinforced plastic panels, Kemlite FRP (Glasbord-P), by Kemlite Company, Joliet, IL ((800) 326-6736), or equal. Color as indicated.

B. Moldings and Trim: Standard trim pieces by Kemlite Company, or equal.

C. Attachment:
   1. Mechanical Fasteners: Per manufacturers recommendations.
   2. Adhesive: Kemlite Multi-Purpose Construction Adhesive 101, or equal.
PART 3 - EXECUTION

3.01 INSTALLATION OF FIBER REINFORCED PLASTIC COATED PANELS

A: Install in accordance with manufacturer's instructions.

1. Install panels vertically.
   a. Apply adhesive beads to back of panels.
   b. Mechanically attach panel edges. Cover screw head with sealant, no ‘buttons’ allowed.
   c. Leave 1/8 inch space between panel edge joints and fill with sealant.

2. Wall Trim: All edges, joints and inside and outside corners are to be finished with trim pieces appropriate to that purpose. Trim shall be installed in accordance with manufacturer's instructions.

3.04 ADJUST AND CLEAN

A. Replace removed plates and fixtures; verify cut edges of wall coverings are completely concealed.

B. Remove surplus materials, rubbish, and debris resulting from wall covering installation upon completion of work, and leave areas of installation in neat, clean condition.

END OF SECTION
SECTION 10201
METAL WALL LOUVERS

PART 1 - GENERAL

1.01 SUBMITTALS

A. Comply with pertinent provisions of Section 01300.

B. Submit shop drawings indicating details of fabrication and erection, anchorage, accessories, and finishes.

PART 2 - PRODUCTS

2.01 LOUVERS

A. Louvers shall be drainable blade type, SED-501, Model, as manufactured by Greenheck, or equal. Size shall be as indicated.

B. Finish: Finish shall be Kynar 500 premium finish coating system. Color shall be selected by architect, to match exterior adjacent finish.

PART 3 - EXECUTION

3.01 INSTALLATION

A. Check to assure that dimensions conform to drawings.

B. Do not install louvers until defects have been corrected.

C. Install louvers as indicated and as shown in shop drawings. Coordinate installation with other trades, including mechanical ductwork and fans.

D. Clean surfaces of louvers and adjacent structure.

E. Repair any damage to louvers to match original, or replace.

END OF SECTION
SECTION 10350
FLAGPOLES

PART 1 – GENERAL

1.01 SUBMITTALS
A. Manufacturer’s Data: Furnish manufacturer’s specifications and installation instructions, including general layout, dimensions, finishes, anchoring and support system, trucks, and finials,

1.02 PRODUCT DELIVERY, STORAGE AND HANDLING
A. Spiral wrap flagpole with heavy kraft paper, wood strip and steel band or polyethylene wrap and pack in tube prior to shipment.
B. Deliver flagpole in original wrappings and in one piece.
C. Store flagpole, in original wrappings, in area protected from weather, moisture, and damage.
D. Handle flagpole so as to prevent damage or soiling.

PART 2 - PRODUCTS

2.01 FLAGPOLES
A. Provide flagpoles as complete unit, furnished by single acceptable manufacturer, including accessories and anchorage devices.
B. Flagpoles shall be cone tapered seamless aluminum, clear anodized finish, 30’ high, 5” butt diameter, 3” top diameter, ground set, ornamental low profile base and standard foundation base, with Eagle ornamental top (15” wingspan), by American Flagpole, Division of Kearney-National, Inc., or equal.
C. Truck Assembly: Cast aluminum, stainless steel ball-bearing, non-fouling, revolving single truck assembly.
D. Cleats and vandal cover:
   1. Quantity: One per halyard.
   2. Size: 9 in.
   4. Vandal cover: Provide manufacturer’s standard vandal proof hinged, lockable cover.
E. Halyard: One #10 (5/16”), white waterproof polypropylene, equipped with chrome swivel snaps to secure two flags.
PART 3 - EXECUTION

3.01 INSPECTION

A. Inspect foundations for proper depth and size of sleeve.

3.02 INSTALLATION

A. Paint portions of flagpole below grade with heavy coat of bituminous paint.

B. Install flagpoles, base assemblies, and fittings in compliance with shop drawings and manufacturer's instructions.

C. Provide positive lightning ground for each flagpole installation.

3.03 TEST AND ADJUST

A. Check and adjust installed fittings for smooth operation of halyards.

END OF SECTION
SECTION 10440
IDENTIFYING DEVICES

PART 1 - GENERAL

1.01 SUBMITTALS

A. Submit fully detailed shop drawings giving sizes, methods of attachment, and all required accessories.

B. Submit product data for all products specified.

PART 2 - PRODUCTS

2.01 IDENTIFYING DEVICES

A. Disabled Parking Signs: Comply with Title 24, California Administrative Code, and as indicated. Signs shall be of steel with reflectorized porcelain finish, white lettering on blue background, and mounted on galvanized steel pipe supports or on building, as occurs.

B. Toilet Room Accessibility Signs: Comply with Title 24, California Administrative Code and Americans with Disabilities Act (ADA) with raised and braille letters and as indicated. Provide room identification signage with tactile and braille, as well as door signage (12" equilateral Triangle for men, 12" diameter circle for women), 1/4" thick Plexiglas, adhesive applied. Symbols and lettering as indicated. Signage colors to be as indicated.

C. Interior Room Identification Signs: Acrylic plastic signs with raised letters and braille, ASI Sign Systems, or equal.

1. As indicated, mounted with double faced tape or adhesive as recommended by manufacturer. Mount 60" above FFE on strike side of door, unless noted otherwise. Confirm location of all signs with Architect prior to installation.

2. Colors shall be as indicated.

3. Style of Lettering: Helvetica Medium 1" high capitals, related lower case and numerals.

4. Text of Signs: The text of signs are indicated on the door schedule and as confirmed with Architect.

D. Exterior Room Identification Signage: As specified for interior room identification signage. Mounting to be with screws through face of sign. Screws to be finished to match sign color.

E. Exterior Building Signage: 1/4" aluminum plate cut out letters. Letters shall be sized as indicated. Letter style shall be as indicated. Color to be factory applied baked enamel finish, after fabrication, color shall be selected by Architect from manufacturer's standard colors. Mounting shall be projected, with threaded studs set in adhesive, letters to project 1/2".

F. Wall Plaque: Fabricate of bronze to dimensions and text as indicated. Mounting shall be by concealed stainless steel studs. Background shall be leatherette textured, finished with satin polished natural color with clear lacquer final coat.
PART 3 - EXECUTION

3.01 IDENTIFICATION SIGNAGE INSTALLATION

A. Install disabled parking signs on pipe supports as indicated.

B. Install toilet room accessibility signs on door as indicated.

C. Install interior room identification signage on wall adjacent to doors, mounting heights shall be 60" above FFE, and as required by code.

D. Install exterior building signage and wall plaque as indicated above and in accordance with manufacturer's recommendations.

END OF SECTION
SECTION 10500
METAL TURNOUT LOCKERS

PART 1 - GENERAL

1.01 SUBMITTALS

A. In addition to product data and installation instructions, provide samples of each color and finish required.

B. Submit shop drawings for metal lockers, verifying dimensions affecting locker installation; include installation details, bases, trim, accessories, and numbering sequence information.

PART 2 - PRODUCTS

2.01 MATERIALS

A. “Geargrid Seattle” storage systems manufactured by Mid-Minnesota Wire and Manufacturing Inc., or equal. Color shall be “Red”.

2.02 LOCKER FABRICATION

A. Construction: All storage systems shall be welded at all applicable joints. Forming of metal shall be completed by standard cold-forming operations. Use of fasteners will only be required to allow for knock down shipping, to secure units to mounting surface and on applicable accessories.

B. Vertical Dividers: Outer frames shall be made of 1.25” O.D. x 16 gauge wall thickness ASTM A513 steel tubing. Inner grid shall be fabricated from .25” diameter ASTM A510 cold drawn steel wire resistance welded to a 3” square pattern. Grid design allows for ventilation and attachment of system accessories. Steel surface finish to be capable of receiving a durable powder coated finish.

C. Mesh back Panel: Shall be manufactured from .25” diameter ASTM A510 cold drawn steel wire resistance welded to a 3” square pattern. Panel design allows for attachment of accessories to compliment maximum usage of unit. Wire surface finish to allow application of durable powder coated finish.

D. Top and Bottom Shelves: Both shelves shall be manufactured from .25” diameter ASTM A510 cold drawn steel wire resistance welded. All bends to be cold formed. Top shelf includes a 20 gauge steel bracket for the mounting of name placards if required. Wire surface finish to allow application of durable powder coated finish.

E. Accessories: Provide for each individual locker opening.

    1. Three (3) hooks shall be supplied with each individual system opening. Hook design allows placement on either grid side panels or mesh back panel. Hooks are cold formed wire resistance welded into a quick-detachable unit. Hook material allows for durable powder coated finish.
2. GearDryer & GearGlove Hangers: Shall be fabricated from .25 diameter 304 stainless steel wire. All bends to be cold formed and joints resistance welded. Hook ends to be coated with black vinyl finish.

3. GearHanger Horizontal Hanging Rod: Horizontal Hanger Rod shall be made of 1.25” O.D. x 16 gauge wall thickness 304 stainless steel tubing with .25” diameter ASTM A510 cold drawn steel wire mounting hooks at each end. Rod to be coated with durable powder coat finish.

4. Helmet Holder: Shall be fabricated from .25” diameter ASTM A510 cold drawn steel wire. All bends shall be cold formed and all intersection points resistance welded. Steel surface to be capable of receiving a durable powder coated finish.

F. Finish: All system components excluding mounting and assembly hardware shall be finished as follows: Components to be cleaned using a phosphatized bath, clear water rinse and electrostatically coated with a durable TGIC powder coating.

PART 3 - EXECUTION

3.01 INSTALLATION

A. Verify that proper backing is installed for mounting of locker units.

B. Install plumb, level, rigid in compliance with manufacturer’s instructions.

C. Fasten lockers securely to wall.

D. Touch up any scratches in finish coat prior to final acceptance.

END OF SECTION
SECTION 10520
FIRE EXTINGUISHERS & CABINETS

PART 1 - GENERAL

1.01 SUBMITTALS
A. Submit fully detailed shop drawings giving sizes, methods of attachment, and all required accessories. Submit manufacturer’s data for all items supplied under this section of work.

1.02 PRODUCT DELIVERY, STORAGE AND HANDLING
A. Pack accessories individually in a manner to protect accessory and its finish.
B. Protect adjacent or adjoining finished surfaces and work from damage during installation of work of this section.

PART 2 - PRODUCTS

2.01 FIRE EXTINGUISHER CABINET AND FIRE EXTINGUISHER
C. Fire Extinguisher: Larsen's Manufacturing Co., #MP5 (MP10 in electrical room). Provide quantity as indicated.

PART 3 - EXECUTION

3.01 PREPARATION
A. Deliver inserts and rough-in frames to jobsite at appropriate time for building-in. Provide templates and rough-in measurements as required.
B. Before starting work notify Architect in writing of any conflicts detrimental to installation or operation of units.
C. Verify with Architect exact location of accessories.

3.02 INSTALLATION
A. Install fire extinguishers and fire extinguisher cabinets in accordance with approved shop drawings.
B. Install true, plumb and level, securely and anchored to substrate.
C. Provide approved identification to meet Fire Marshal's requirements.

END OF SECTION
SECTION 10800
TOILET ACCESSORIES

PART 1 - GENERAL

1.01 SUBMITTALS

A. Data to illustrate each accessory at large scale and show installation method including requirement for blocking and backing, by others.

B. Mirrors: Provide manufacturer's 15 year guarantee against silver spoilage.

1.02 PRODUCT DELIVERY, STORAGE AND HANDLING

A. Pack accessories individually in a manner to protect accessory and its finish.

B. Protect adjacent or adjoining finished surfaces and work from damage during installation of work of this section.

PART 2 - PRODUCTS

2.01 MATERIALS

A. Manufacturer: Bobrick Washroom Equipment, Inc., or equal as follows:

1. Toilet Seat Cover Dispenser and Toilet Tissue Dispenser: B-3474.

2. Recessed Toilet Tissue Dispenser for Two Rolls: B-697.


5. Soap Dispenser: B-2112 and B-822 as indicated.

6. Stainless Steel Angle Frame Mirror: Series 290, size as indicated on drawings.

7. Grab Bars: Bobrick #256 Series, 1-1/2" diameter, length as indicated, stainless steel with concealed mountings.

8. Shower Door and wall panel: Extruded aluminum Alloy frame, obscure safety glazing, continuous 1/8" pin aluminum piano hinge and magnetic safety latch, by American Shower Door Company, Keystone, or equal. Door handle shall be integral part of door construction.

9. Robe Hook: B-671, quantity as indicated.

10. Shelf with Mop and Broom Holder and hooks: B-239X34.


PART 3 - EXECUTION

3.01 PREPARATION

A. Deliver inserts and rough-in frames to jobsite at appropriate time for building-in. Provide templates and rough-in measurements as required. Verify that all required backing and blocking is provided.

B. Before starting work notify Architect in writing of any conflicts detrimental to installation or operation of units.

C. Verify with Architect exact location of accessories.

D. Provide templates and rough-in measurements for preparation of opening in toilet partitions.

3.02 INSTALLATION

A. Install fixtures, accessories and items in accordance with manufacturer’s printed instructions.

B. Install true, plumb and level, securely and anchored to substrate.

END OF SECTION
SECTION 10850
MISCELLANEOUS ACCESSORIES

PART 1 - GENERAL

1.01 SUBMITTALS
A. Manufacturer’s Data to describe and illustrate each accessory at large scale and show installation method including requirement for blocking and backing, by others.

1.02 PRODUCT DELIVERY, STORAGE AND HANDLING
A. Pack accessories individually in a manner to protect accessory and its finish.
B. Protect adjacent or adjoining finished surfaces and work from damage during installation of work of this section.

PART 2 - PRODUCTS

2.01 MATERIALS
A. 911 Phone: ADA Outdoor Telephone, #GB70VNXX, by Allen Tel Products, Inc. (www.allentel.com), or equal. Provide in red color. Label as 911 Emergency Phone.
B. Public Notice Board: 30” x 40” “Superior Pin Notice Board for External Use”, by Horizon Signs LTD. or equal.
C. Stainless Steel Wall Skirt: Type 316, 22 gauge stainless steel with hemmed edges. Fabricate in shop to greatest extent possible, to size and shape indicated. Provide in quilted finish where indicated.
D. Corner Guard: Type 304, 18 gauge, Stainless Steel, 1-1/2” x 1-1/2” x 48” corner guards, by IPC, Miller Protection Systems, American Floor Products Co. Inc., or equal. Provide with #4 satin finish.
E. Wall Mount Cleaning Center (Broom and Wash Center): Broom and Wash Center as indicated by GearGrid (888-643-6694), or equal. Provide with red powder coated finish.
F. Hose Storage Racks: (2) Two-Tiered mobile hose rack, #HC-64, and (2) Three-Tier mobile hose rack, #HC-64-3T, by Groves, Inc. Or equal. Provide with red powder coated finish.

2.02 OTHER MATERIALS
A. All other materials, not specifically described but required for a complete and proper installation of the work of this Section, shall be as recommended by the manufacturer of the materials used.
3.01 PREPARATION

A. Deliver inserts and rough-in frames to jobsite at appropriate time for building-in. Provide templates and rough-in measurements as required.

B. Examine the areas and conditions under which materials are to be placed. Correct conditions detrimental to the proper and timely completion of the Work. Do not proceed until unsatisfactory conditions have been corrected.

C. Verify that required solid blocking and backing is provided as necessary for installation of specified units.

3.02 INSTALLATION

A. Install in continuous sections per manufacturer’s recommendations

B. Install all items true, plumb and level, securely and anchored to substrate.

END OF SECTION
SECTION 11450
KITCHEN, LAUNDRY & SPECIALTY EQUIPMENT

PART 1 - GENERAL

1.01 DESCRIPTION
A. Mechanical and Plumbing requirements are specified in Division 15.
B. Electrical services and connections are specified in Division 16.

1.02 SUBMITTALS
A. Product Data: Submit manufacturer's specifications and installation instructions for each type of kitchen equipment. Submit operating and maintenance instructions for each item of equipment.
B. Product Warranties: Submit manufacturer's standard written warranty for each item of equipment.

1.03 COORDINATION
A. Verify that all equipment provided will function properly with the building elements as indicated, including mechanical, plumbing and electrical connections. Immediately notify Architect of any discrepancies.

PART 2 - PRODUCTS

2.01 MATERIALS
A. Finish: All equipment shall have a stainless steel finish unless otherwise noted.
B. Dishwashers: Built-in type, GE Profile #PDT760SSFSS or equal.
C. Refrigerators: Kelvinator KCBM180RQY
D. Freezer: Kelvinator KCBM180FQY
D. Range #GR486G by Wolf Appliance Inc., or equal.
E. Range Hood: #PW542718, by Wolf Appliance Inc., or equal, with 900 CFM internal fan. Provide with four lights. Provide with removable, washable grease filter screens. Provide with adjustable fan control and blower. Blower and lamp switches shall be integral with the hood. Provide with hood duct cover.
F. Washing Machine/Extractor Unit: #30022VRJ, Gear Guardian Washer Extractor by Milnor Corp., or equal. Provide with electronic controls and a dual drain system. Provide with stainless steel finish.
   1. Provide with door hinged on right side.
   1. Provide with door hinged on left side.
H. Washing Machine: LG WM3770HVA. Finish shall be stainless steel

J. Dryer: LG DLGX3371V, gas dryer. Finish shall be stainless steel

K. Microwave: #R-530ES, by Sharp.


PART 3 - EXECUTION

3.01 INSTALLATION

A. Installation: Comply with manufacturer’s instructions and recommendations.

B. Built-In Equipment: Securely anchor units to supporting cabinetry or countertops with concealed fasteners. Verify that clearances are adequate for proper functioning and rough openings are completely concealed. Verify that all required backing and blocking is provided to secure equipment to structure.

C. Freestanding Equipment: Place units in final locations after finishes have been completed in each area. Verify clearances are adequate for proper operation of equipment.

D. Utilities: Refer to Divisions 15 and 16 for plumbing and electrical requirements.

E. Testing: Test each item of equipment to verify proper operation. Make necessary adjustments.

F. Accessories: Verify that accessory items required have been furnished.

G. Cleaning: Remove packing material from equipment items and leave units in clean condition, ready for operation.

END OF SECTION
SECTION 11455

AUDIO-VISUAL EQUIPMENT

PART 1 - GENERAL

1.01 DESCRIPTION

A. Work under this section includes the installation of audio-visual equipment as indicated below.

B. Electrical services and connections are specified in Division 16.

1.02 SUBMITTALS

A. Drawings required for approval prior to fabrication and installation:

B. A complete Bill of Quantities, including all material, components, devices and equipment, both primary and ancillary, required for the Work specified herein. Include the following information for each item submitted:
   1. Specification sub-section that the item is fulfilling.
   2. Description of item being submitted.
   3. Manufacturer's name and model number.
   4. Quantity required for each system.

C. Complete, comprehensive, single-line diagrams including all equipment, devices and wiring, completely identified and coordinated with the Bill of Quantities described above.

D. Complete, scaled equipment rack elevation drawings (if applicable), including equipment designations, manufacturer's names and model numbers, custom panels, rack locations and rack designations.

E. Complete, full-scale patch panel elevation drawings (if applicable) showing appearance of each patch panel, complete with designations.

F. Complete, 1/2-scale dimensioned audio/video/control panel plans and layout drawings, including engraving, schematic diagrams, run sheets and finish schedules.

G. Complete, detailed drawings of all Contractor fabricated or customized items showing all components, devices and equipment dimensions; equipment or device manufacturers' names and model numbers; component values; and terminal designations, types, and locations.

H. Run sheets and point-to-point wiring drawings: Clearly show at each terminal point, the type of connector to be used and include typical wiring details of each connector. Note where shields are connected and where they will float to ensure the integrity of the grounding system. Call out wire types and color codes where appropriate. Assign wire numbers and patch panel locations to every wire and patch point in the System.

I. Bound volume or volumes of comprehensive manufacturer's specifications for all material, devices, components and equipment to be provided as part of the Work of this Section.

J. A schedule of all deliverable materials required for the Work of this Section, along with
associated storage and portage requirements and arrangements.

K. A schedule of proposed keying for all lockable panels, equipment racks, enclosures cabinets and switches.

L. Record Drawings and Instruction Manuals:

1. Functional Diagrams: Supply single-line block diagrams showing interconnection of all components; including receptacles, terminal blocks, controls transformers and loudspeakers in addition to the active elements. Include terminal and cable numbers.

2. Receptacle Location Plan: Furnish a plan of the relevant parts of the systems showing locations and designations of all receptacles.

3. Operation and Maintenance Manuals: Submit three (3) sets of operating and maintenance data for the systems specified herein. Include the diagram and plan specified above as well as manufacturer's installation, operation and service information including schematic diagrams and "trouble-shooting" information for each item of equipment furnished.

4. Training Manual: Produce a manual for purposes of training end users in the day-to-day operations of the audio-visual systems. Include condensed, simplified instruction on the use of every major sub-system. Assume the reader to be of a nontechnical background. Supply two copies of this manual.

1.03 COORDINATION

A. Verify that all equipment provided will function properly with the building elements as indicated, including mechanical, plumbing and electrical connections. Immediately notify Architect of any discrepancies.

1.04 INSTALLER QUALIFICATIONS

A. The work specified herein, and in each of the allied sections, shall be accomplished by a single electronic systems specialty contractor experienced in the design, fabrication, installation, commissioning and warranty contract management of systems such as those described in each section.

B. An Audio-Visual Systems Contractor, normally engaged in the business of audio-visual systems installation and maintenance, shall perform the work completed under this Section. The prospective contractor shall show proof, as part of the bid, that he has been in the audio-visual systems business, continuously for not less than the five year period immediately preceding the bid. The Contractor shall be able to provide complete professional engineering, design, fabrication, installation, project management and warranty service personnel to guarantee a complete, functional system in compliance the intent of this Specification.

C. The Contractor shall hold current, at the time of bid, valid franchises for the line of equipment furnished by him under these Specifications.

D. Submit a Statement of Qualifications that, in addition to confirming the above requirements, shall include a list of at least four (4) installations, similar in scope to the Work of this Section, completed within the previous twenty-four (24) months. The list shall include the name of the project, its location, a brief description of the scope of the project and the name and telephone number of a representative of the project owner familiar with the contractor's work.
1.05 RELATED WORK BY OTHERS

A. Certain equipment and materials shall be furnished and installed under other sections of work. Unless otherwise indicated in these Specifications or on the Drawings, these will include the following:

1. All conduits with pull strings, wireways, connection boxes, pull boxes, junction boxes and outlet boxes permanently installed in walls, floors and ceilings shall be provided under Section 16.

2. All Power feeder and branch circuit panels required to power the System specified herein shall be provided under Section 16.

3. All room power receptacle outlets shall be provided under section 16.

4. All structural work, wall openings, fire prevention and safety devices, rough and finish trim, painting and patching, blinds, floor coverings, glazing and acoustical treatments, except as may be individually identified in this specification, shall be under other sections of work.

5. All voice, data and television signal routing and distribution systems, except as individually identified in this specification shall be under other sections of work.

6. All millwork and millwork modifications required to accommodate installation of audio-visual equipment and related cabling and connections, except as may be individually identified in this specification, shall be under other sections of work.

7. All heating, ventilating and air conditioning systems shall be under other sections of work.

1.06 QUALITY ASSURANCE

A. The intent of these Specifications is to describe and provide for complete audio-visual systems of high professional quality and reliability. Professional performance standards by the Audio-Visual Systems Contractor (hereafter referred to as the Contractor) and the equipment will be required

1.07 MAINTENANCE SERVICE

A. Provide maintenance service for a period of one year after acceptance of installation.

B. Service shall consist of at least two semi-annual preventative maintenance visits to the Project site for checking and adjustment of equipment.

C. Answer all service requests within twenty-four (24) hours. Repair deficiencies or provide loaner equipment to maintain full system operability within seventy-two (72) hours of a service request.

PART 2 - PRODUCTS

2.01 TELEVISION AND MOUNTING HARDWARE

A. Bunk Room (provide for each bunk room):

1. Bunk Room Mounting Bracket: Rocketfish - Full-Motion TV Wall Mount for 19" - 39" TVs - Black
B. Day Room:
   1. Mounting Bracket: Rocketfish Tilting TV mount for 32”-70” TV - Black
   2. Surround Sound System: Sony Home Theater System # HT-DDW700

D. Fitness Room:
   1. Mounting Bracket: Rocketfish - Full-Motion TV Wall Mount for 19” - 39” TVs - Black
   2. Tuner: Sony #STR-DE197
   3. Speakers: Bose Acoustimass – 3 Series III (Bass Module) and satellite speakers (pair).

PART 3 - EXECUTION
3.01 INSTALLATION

A. General:
   1. The following installation requirements shall govern the design, fabrication and installation of
      the System(s) specified herein. In case of a discrepancy between these overall system
      standards and the individual equipment item specifications, the latter shall govern.
   2. The equipment specified shall be installed according to standards of good human
      engineering practice and the conditions specified herein.
   3. Workmanship on the installed systems shall be of professional quality, best commercial
      practice, state of the art, and accomplished by persons experienced in the techniques and
      standards of the particular industries involved.
   4. The Specifications describe required performance. The Specifications with the contract
      Drawings indicate a general design; it is the intention of the Specifications that the Contractor
      shall supply from his background of experience and knowledge the necessary supporting
      details; for example, the implementation of specific components into functioning sub-
      systems.
   5. In general, the Drawings show dimensions, positions, and type of construction. The
      specifications describe materials, qualities and methods. Any work called for on the
      drawings and not mentioned in the Specifications, or vice versa, shall be performed as
      though fully set forth in both. In case of conflict between the Drawings and the
      Specifications, the precedence of the documents shall conform to the General Conditions.
      Work not particularly detailed, marked or specified shall be constructed to be the same as
      similar parts or areas that are detailed, marked or specified.

B. Conduit System:
   1. Cable and wire for the Systems shall be provided and pulled by the Contractor. Each conduit
      shall contain wire or cable of the same signal level only. Therefore, low level lines, medium
      level lines, high level loudspeaker lines and control circuits, etc., shall all be run in their
      respective, separate conduit.
   2. The conduit system shall be installed as specified in this section, Division 16 and as
indicated on the Drawings.

3. The Contractor shall inspect the work at appropriate times during construction, verify that all raceway has been de-burred and properly joined, coupled, and terminated prior to installation of cables. Verify that all raceway is clear of foreign matter and substance prior to installation of wire or cable. Notify the Architect in writing of any discrepancies between the conduit diagrams and field conditions.

4. The equipment racks shall be electrically isolated from the building raceway system, building structural steel and HVAC equipment or ducting.

C. Wire and Cable Installation:

1. Mark all cables, regardless of length, with permanent, non-handwritten number or letter cable markers within two inches of terminations. After attachment at terminations, these markers shall be accessible and readable for identification. There shall be no unmarked cables installed at any place in the System. A careful running log and detailed wiring diagram shall be furnished with these numbers shown.

2. Provide any of the following:
   a. Self-laminating adhesive strip printed labels wrapped the full circumference of the wire; equivalent to Thomas and Betts or Panduit Insta-code.
   b. Heat shrinkable factory hot stamped; equivalent to Bradysleeve Heatshrink.
   c. All wire and cable shall be continuous and splice free for the entire length of run between designated connections or terminations.

3. Group all cables according to the signals being carried. For runs longer than 6 feet in conduit, in order to reduce signal contamination, form separate groups for the following cables:
   a. A.C. Power Cables
   b. Audio, Video and Data Signal Cables less than +30 dBm
   c. Audio Signal Cables greater than +30 dBm

4. As a general rule, route all power, control and high level signal cables on the left side of equipment racks, as viewed from the rear. Route all other cables on the right side of equipment racks, as viewed from the rear.

5. Install no cable with a bend radius less than that recommended by the cable manufacturer.

6. Dress, lace or harness all wire and cable to prevent mechanical stress on electrical connections. No wire or cable shall be supported by a connection point. Provide service loops where hinged panels are to be interconnected.

D. Wiring Practices:

1. Maintain consistent absolute signal polarity at all connectors, patch points and connection points accessible in the system. Where applicable, a positive polarity electrical signal shall yield positive acoustic pressure from the loudspeakers.

2. Wire 3-pin XLR and TRS type connectors in accordance with the following:
a. pin 1 or sleeve: drain wire
b. pin 2 or tip: in-phase, red or white (+)
c. pin 3 or ring: out-of-phase, black (-)

3. Land all non-coaxial field wiring entering each equipment rack at specified terminal devices prior to connection to any equipment or devices within racks.

4. Make all connections to screw-type barrier strips with insulated crimp-type spade lugs. Lugs are not required at captive compression, Phoenix type, terminal blocks.

5. All terminated shield drain wires shall be insulated with Teflon or heat shrinkable tubing.

6. Apply any and all crimp connectors with the manufacturer's recommended ratchet type tool and correct crimp dies for connector and wire size. Plier type crimp tooling shall not be acceptable.

7. The Contractor shall wire all equipment racks completely in their shop. No internal rack wiring shall be performed at the Project site.

8. Utilize right angle XLR connectors with all microphone and other audio cables for connections made to XLR receptacles in wallplates and poke-throughs that are located in areas that would make conventional XLR connectors susceptible to damage.

E. Grounding Practices:

1. Comply with all sections of the latest National Electrical Code (NEC).

2. The grounding method shall insure that the System is free of the following under any mode of operation:
   a. Hum
   b. Buzz
   c. Distortion
   d. Crosstalk
   e. RF oscillation, pickup and interference

3. Audio cable shields shall be connected to ground at one point only. (Exceptions may be made for phantom powered microphones, some ICM / IFB systems, and where manufacturers' documentation recommends otherwise.) For inter and intra-rack wiring this requires the shield drain to be connected at one end only. As a general rule, the shield should be grounded at the input of devices and lifted at the output.

4. In general, it shall be the responsibility of the Contractor to follow good engineering practice, and to deviate from these practices only when necessary to minimize crosstalk and to maximize signal-to-noise ratios within the audio, video and control systems.

F. Device Mounting:

1. Comply with applicable Code and the requirements of the Authorities having jurisdiction.
2. Provide safety a factor of seven (7) to one (1) or as required by Code, whichever is greater.

3. Loudspeaker enclosures, projectors and related support shall not occlude or otherwise conflict with any lighting.

G. Seismic Restraints:

1. All hanging or free-standing equipment and cabinets furnished including, but not limited to, racks, loudspeakers, projectors, etc., shall be secured to substantial building structure so as to resist seismic acceleration in any direction up to a limit of 1.0 G or the limit set forth by the Authorities having jurisdiction, whichever is greater.

2. Rack bracing, and other seismic restraints are not shown on the Contract Drawings; it shall be the Contractor's responsibility to develop these drawings.

3. Submit the drawings to the Architect for review after they have been approved and stamped by a structural engineer registered in California, if required.

3.02 ADJUSTING PROCEDURES AND ACCEPTANCE TESTING

A. Acceptance testing will include operation of each major system and other components deemed necessary. Installed and loose equipment will be inventoried for correct quantity. Assist the Consultant in performing final System adjustments and acceptance testing. Provide all labor, materials and tools necessary to conduct these adjustments and tests.

B. Verification:

1. Verify the following before beginning actual tests and adjustments on the System:
   
   a. Electronic devices are properly grounded.
   
   b. Powered devices have A.C. power from the proper circuit; and that Hot, Neutral and Ground conductors are properly terminated.
   
   c. Insulation and heat shrink tubing are present where required.
   
   d. Dust, debris, solder splatter, etc., has been removed.

2. Cables have been dressed, routed and labeled in a professional manner; connections are consistent with regard to signal polarity.

3. All systems are in first-class working condition and free of short circuits, ground loops, parasitic oscillations, excessive system noise beyond published specifications of the equipment, hum, RF interference or instability of any form.

4. All sound and video circuits have been tested and are in perfect working order.

5. All equipment controls are labeled, even if unused. If permanent labels cannot be furnished prior to system inspection, temporarily label every control as to its function with write-on tape.

6. Operation manuals for each piece of equipment furnished are on hand at the job site.

7. Test Equipment: Contractor shall provide all required test equipment on site for final acceptance testing. This equipment shall be available throughout the entire period of final acceptance testing.
3.03 CLOSEOUT

A. The final acceptance of the System by the Owner will be based upon the report of the Architect following inspection, testing and demonstration.

B. Should the performance testing show that the Contractor has not properly completed the Systems, the Contractor shall make all necessary corrections or adjustments and a second performance demonstration shall be arranged, at the Contractors expense.

C. Portable Equipment shall be furnished and spares supplied to the designated representative of the Owner, along with complete documentation of the materials provided. Where applicable, deliver portable equipment in the original manufacturer's supplied packaging.

D. Submit Project Record (As-Built) Documents.

E. Conduct all specified training; provide Consultant with at least 7-day notice of scheduled training date.

F. Submit Warranty date to run from the date of Acceptance of the Work of this Section.

3.04 OWNERS RIGHT OF USE OF EQUIPMENT

A. Acceptance of the Work of this Section will be after completion of deficiencies and adjustments required by the "Punch List" which results from Adjusting Procedures and Acceptance Testing of the completed installation. The Owner reserves the right to use equipment, material and services provided as part of the Work of this Section prior to Acceptance without incurring any obligation to Accept any equipment or completed systems until all Punch List work is complete and all systems comply with the Contract Documents; or accept any claim for additional cost or time.

END OF SECTION
SECTION 12511

WINDOW BLINDS

PART 1 - GENERAL

1.01 SUBMITTALS

A. In addition to manufacturer's product data and installation instructions, submit the following:

1. Samples of materials and finishes.

2. Shop drawings for installations not fully detailed in product data.

1.02 QUALITY ASSURANCE

A. Provide complete assemblies produced by one manufacturer for each type required including hardware, accessory items, mounting brackets, and fastenings.

PART 2 - PRODUCTS

2.01 VERTICAL BLINDS

A. LouverDrape, "Zirlon Wheeled Vertical Blind" System, by LouverDrape, or equal, standard vertical blind unit complete with track system, operating mechanisms, louver blades, valance and accessories, as follows:

1. Track system formed to accommodate indicated type of operating mechanism, with end caps, and as follows:

   a. Standard Duty Type Track: Extruded aluminum channel with a min. width of 1 5/16" and a min. height of 1 7/16".

2. Application: Tracks at head with rotating mechanisms in each coordinated.

3. Aluminum Track Finish: Clear anodized, AA C22A21 or A-

4. Pivot Mechanism: Geared rotating mechanism providing full synchronous 360o rotation for each louver blade, operated as follows:

   a. Bead chain operation.

5. Traversing Mechanism: Assembly of carriers and linkages designed to maintain positive even spacing of louver blades, cover operated and as follows:

   a. Standard Duty Type Carriers: Carrier track shall be made from Delrin, 5/16" wide, and shall traverse on Zirlon wheels. No glides or sliders are allowed.

6. Louver Blades: 3-1/2", removable, attached to carriers with bracket, clip or hook as standard with manufacturer for type of blade and as follows:

   a. Material and Shape: Extruded polyvinyl chloride, solid type, flat.
b. Color: Color shall be selected by Architect from manufacturer's standard colors.

c. Valance: Provide with valance as standard with the manufacturer, in color to match blades.

7. Installation brackets including mounting hardware as recommended by manufacturer for installation indicated.

2.02 BLACKOUT BLINDS

A. “Duette Easyrise Commercial 3/4” Opaque Honeycomb Shades”, by Hunter Douglas, or equal. Provide standard window shade unit complete with operating mechanisms, valance and accessories

1. Fabric shall be permanent, flame resistant, non-woven polyester formed into opaque 3/4” hexagonal honeycomb cells, in stacked tubular construction. Single cell construction with each cell an independent piece of fabric and containing a metalized polyester film core. Color shall be as selected by Architect. Finish to be duotone.

2.03 FABRICATION

A. Fabricate units to completely cover openings for wall mount installation. For continuous window wall installations, fabricate units so that ends occur only over mullions or other defined vertical separations, unless otherwise indicated.

PART 3 - EXECUTION

3.01 INSTALLATION

A. Install units to comply with manufacturer's instructions for type of mountings and operations required. Position units plumb and true, securely anchored in place with recommended hardware and accessories to provide smooth, easy operation.

END OF SECTION
SECTION 15050

MECHANICAL GENERAL PROVISIONS

PART 1 - GENERAL

1.01 GENERAL CONDITIONS:

The general conditions and Division 1 are a part of this section and the contract for this work and apply to this section as fully as if repeated herein. This section, 15050, applies to all Division 15 categories, including but not limited to:

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<td>15838</td>
<td>Vehicle Exhaust Removal System</td>
</tr>
</tbody>
</table>

A. Reference to Other Sections: The applicable requirements from the above sections shall form a part of the mechanical work and each section shall consult the other sections in detail for general and specific requirements.

1.02 SCOPE:

These Division 15 specifications and the accompanying drawings are intended to comprise the furnishing of all labor, and the furnishing and installing of all materials, equipment and supplies as specified herein and required for the satisfactory completion by the Contractor of all work pertaining to mechanical trades.

1.03 EXPLANATION OF DRAWINGS AND REFERENCE TO SCHEDULES:

A. The drawings and these specifications are complementary to each other in that all apparatus, materials and equipment outlined in the drawings and/or specified herein shall be considered essential to the contract.

B. The specifications are intended to describe the quality and character of the materials and equipment and methods of installation. All miscellaneous items of work and materials necessary for the completion of the installation shall be provided, whether or not mentioned in the specifications or shown on the drawings.

C. Space allotted, clearances, access, electrical data, structural supports, etc., on drawings, is for equipment models and sizes as listed in schedules on plans. The Contractor shall assume the responsibility for the coordination with other trades required in the use of equal or substitute equipment or materials and pay all difference in cost arising from such substitutions, regardless of approval.

D. Separate Sections cover the Site Work, Architectural Work and the Electrical Work. The Contractor shall familiarize themselves with the entire specification.

E. Should there be any question as to the scope of the work for which the Contractor is responsible, they shall ask the Architect for an interpretation before submitting their bid. In the event that the Contractor finds discrepancies or omissions, or is in doubt as to the exact meaning of the plans and/or specifications, they shall, before submitting bid, contact the Mechanical Engineer for clarification.

F. For purposes of clearness and legibility, drawings are essentially diagrammatic and, although size and location of equipment are drawn to scale wherever possible, the Contractor shall make use of all data in all the contract documents and shall verify this information at building site.
G. The drawings indicate required size and points of termination of pipes, and suggest proper routes to conform to structure, avoid obstructions and preserve clearances. However, it is not intended that drawings indicate all necessary offsets, and it shall be the work of the Contractor to make the installation in such a manner as to conform to structure, avoid obstruction, preserve headroom and keep openings and passageways clear.

H. It is intended that all apparatus be located symmetrical with architectural elements. Refer to architectural details in completing the correlating work.

I. The Contractor shall fully inform themselves regarding any and all peculiarities and limitations of the spaces available for the installation of all work and materials furnished and installed under the contract. They shall exercise due and particular caution to determine that all parts of their work are made quickly and easily accessible.

J. The Contractor shall study all drawings and specifications to determine any conflict with ordinances and statutes. Any errors or omissions shall be reported, and any changes shall be shown in the as-built drawings and the additional work performed at no cost to the Owner.

K. The submittal of bid shall indicate that the Contractor has examined the site and the drawings and has included all required allowances in their bid. They shall also determine in advance and make allowances for the methods of installing and connecting the equipment, the means of getting equipment in to place and they shall make themselves familiar with all the requirements of the contract. No allowance will be made for any error resulting from the Contractor's failure to visit job site and to review drawings, and bid shall include costs for all required drawings and changes as outlined above.

L. The Contract Drawings indicate the extent, the general location and arrangement of equipment, piping, ductwork, etc. Equipment, piping and ductwork shall be located to avoid interference with electrical, plumbing and structural features. All locations for mechanical work shall be checked and coordinated with the building, structural, electrical work.

M. If any conflicts occur necessitating departures from the Contract Drawings, details of departures and reasons therefore shall be submitted as soon as practical for written approval, and the piping, ductwork, fixtures or equipment affected shall not be installed until approval is received.

N. Reference to Drawing Schedules:

1. Refer to equipment schedule for unit identification number and corresponding capacity and design requirements.

2. Wherever schedules or notes appear on the Drawings or in the specifications in which sizes and capacities of equipment are indicated, the equipment furnished and installed under this contract shall meet the following requirements under operating conditions:

1.04 DEFINITIONS:

A. "Provide" shall mean "provide complete in place," that is, "furnish and install."

B. "Piping" shall mean pipes, fittings, valves and all like pipe accessories connected thereto.

C. Pressure ratings specified, such as for valves and the like, is the design working pressure and is for and with reference to the fluid which the device will serve.

D. "Ductwork" shall mean ducts, plenums, compartments, casings or any like devices, including the building structure, which is used to convey or contain air.
E. "Building Boundary" shall mean exterior building walls.

F. "Mechanical Work" shall mean all work specified and shown in the Division 15, "Mechanical," categories. Mechanical Work generally includes: Plumbing, Heating, Ventilating, Air Conditioning and Fire Protection systems.

1.05 CODES AND STANDARDS:

A. All work, material or equipment shall comply with the requirements of codes, ordinances and regulations of the local Government having jurisdiction at the location of the work, including the regulations of serving utilities, and any participating Government agencies having jurisdiction.

B. The latest editions of the following Specifications, Codes and Standards shall form a part of these specifications, the same as if herein written out in full, and all materials and installations include but not be limited to:

1. CMC (California Mechanical Code)
2. ASHRAE (American Society of Heating, Refrigeration and Air Conditioning)
3. UL (Underwriters’ Laboratories, Inc.)
4. AMCA (Air Moving and Conditioning Associates)
5. California State Division of Industrial Safety
6. SMACNA HVAC Duct Construction Standards
7. CBC (California Building Code)
8. NFPA (National Fire Protection Association)
9. San Diego County Codes
10. California Administrative Code, Title 24
11. Requirements of the State Fire Marshall
12. National Electrical Code
13. ASTM (American Society for Testing and Materials)
14. AGA (American Gas Association)
15. OSHA
16. CPC (California Plumbing Code)
17. Local Skylonda jurisdiction requirements

C. No requirement of these drawings and specifications shall be construed to void any of the provisions of the above standards. No apparatus, equipment, device or construction shall be installed which will provide a cross connection permitting any backflow or siphonage from any source into the domestic water supply system.

1.06 PERMITS AND FEES:

Obtain all permits, patent rights, and licenses that are required for the performing of the work by
all laws, ordinances, rules and regulations, or orders of any officer and/or body, give all notices necessary in connection therewith, and pay all fees relating thereto and all costs and expenses incurred on account thereof. No work shall be covered before inspection by the jurisdictional authority and the Architect.

1.07 SUPERVISION AND COOPERATION:

A. The Contractor shall include the services of experienced superintendents for each sub-section who shall be constantly in charge of the work, together with the qualified journeymen, helpers, and laborers, required to properly unload, install, connect, adjust, start, operate and test the work involved, including equipment and materials furnished by others.

B. The work under this section shall be in cooperation with the work of other trades to prevent conflict or interference and to aid rapid completion of the overall project.

1.08 PROJECT SITE VISIT:

Periodic visits to the project site by the Engineer are for the expressed purpose of verifying compliance with the contract documents. Such site visits shall not be construed as construction supervision, i.e., the Engineer assumes no responsibility for providing a safe place for the performance of the work by the Contractor or the Contractor's employees or the safety of the supplies of the Contractor. Neither shall such site visits relieve the Contractor of the responsibility for the discovery of their own errors and the correction of them, nor of the responsibility of properly performing the work.

1.09 COORDINATION:

A. The Contractor shall be responsible for providing all information, drawings or layouts of equipment or work under this section which affect the work of the other trades.

B. In case changes in the indicated locations or arrangements are necessary due to developed conditions in the construction, or rearrangement of furnishings, or equipment, these changes shall be made without extra cost to the Owner, provided the change is ordered before work directly connected is installed, and no extra materials are required.

1.10 EXISTING UTILITIES:

A. The location of utilities shown on the plumbing plans is the best known information available at time of design. The Contractor shall contact the appropriate agencies and confirm the information and make arrangements for connection thereto, prior to excavation and installation of any piping or systems.

B. Prior to installation of any waste and soil lines the Contractor shall physically verify whether the building sewer can be installed and properly connected to the sewer main. Any work requiring added expense which is caused by the Contractor to make such physical verification shall be borne by the Contractor.

1.11 UTILITY SERVICES DURING CONSTRUCTION:

All water and electric power used for construction shall be paid for by the Contractor.

1.12 SUBMITTALS AND SHOP DRAWINGS:

A. Equipment and materials shall be submitted to the Architect for approval within 30 days after award of Contract and prior to fabrication or purchase of equipment and materials.
B. Installation of materials or ordering of equipment prior to approval of submittals is done entirely at the risk of the Contractor.

C. Unless otherwise specifically directed in the following specifications, the submittals by the Contractor to the Architect shall be as follows:

1. Submit all items at one time in a neat and orderly manner with index tabs. A partial submittal will not be acceptable.

2. Reference catalog cuts and brochures of products to proper paragraph in specifications. Furnish numerical index by specification article number, listing product name, catalog number and reference to page number of submittal brochure.

3. Cross reference individual catalog numbers of substitute products to number of specified materials.

4. Bind submittal in booklet form.

5. Submit manufacturers’ certification that equipment meets or exceeds the minimum requirements as specified.

6. Where materials, equipment and installations are specified to conform with societies or agencies such as ANSI, ASHRAE, SMACNA, etc., submit certification of such compliance.

7. The submittal shall be complete and with catalog data and information properly marked to show, among other things, material capacity and performance to meet capacities or performance as specified or indicated. Arrange the submittals in the same sequence as the specifications and reference in the upper right-hand corner, the particular specification provision for which each submittal is intended. Incomplete submittals will be rejected, unless prior approval for partial submittal has been obtained.

8. The Contractor is responsible for confirmation of code approval of material and equipment. Certification of code conformance by the manufacturer shall be submitted for:

   a. Water heaters.
   b. Backflow preventors.

9. If the Contractor submits a product that is specified, a complete set of brochures, rating tables, etc., is still required for future reference.

10. Review of the submittal is only for general conformance with design concept of project and general compliance with information given in the contract documents. The Contractor is responsible for confirmation and correlation of the dimensions, quantities and sizes, for information that pertains to fabrication methods or construction techniques, and for coordination of work of all trades. Deviations from drawings and specifications shall be clearly and completely indicated (by a separate letter) in the submittal.

11. For items which are not manufactured and which have to be specifically fabricated including drawings and typical duct construction and complicated portions of ductwork, six copies of shop drawings and detail description shall be submitted. Shop drawings shall be submitted with such promptness as to allow ample time for examination and any re-submittal.

D. For duct and piping shop drawing development, the contractor shall obtain the most current architectural, structural and electrical CAD files to be overlaid on to mechanical duct and piping shop drawings.
1.13 SUBSTITUTIONS:

A. Substitution of an article, device, product, material, fixture, form or type of construction, other than those specified by name, make or catalog number is not permitted before the bid date. The contractor awarded the project, may propose substitutions as part of the submittal package as value engineering items. Written approval cannot be finalized until submittals are examined and credit to the owner is established.

B. If the use of substituted equipment results in an increase in the cost, including the work of other trades, the Contractor shall be solely responsible for payment of said increase in cost.

1.14 GUARANTEE:

A. In addition to the guarantees required elsewhere, all work, materials and equipment provided under the mechanical sections shall be guaranteed for a period of one year from the date of acceptance of the work by the Owner. Should any trouble develop during this period due to defective materials or faulty workmanship, the Contractor shall immediately furnish all necessary labor and materials to correct the trouble without cost to the Owner. The Contractor, under this guarantee, shall be responsible for all damages to any part of the premises caused by equipment furnished under this section.

B. Furnish written certified guarantee, in acceptable form, to the Owner, against defective workmanship, materials and operating equipment. Further guarantee to rebalance and adjust entire system, or any part thereof as required for perfect operation for a period of at least one year after acceptance. Compressors shall have five year warranty. Repair, replace and make satisfactory all defective items and work, holding the Owner free from any cost and liability in connection therewith, for the term of the guarantee.

1.15 INTERRUPTION OF SERVICES:

A. Existing services required to stay in operation in areas not remodelled shall be maintained rerouted or otherwise provided with temporary connection to prevent interruptions.

B. If impossible to prevent interruptions they shall be performed during "off-hours" and coordinated with the Owner's Representative.

C. Provide a minimum of seven (7) days written notice of interruption. Do not interrupt services without written consent of the Owner.

1.16 DAMAGE BY LEAKS:

The Contractor shall be responsible for damage to the grounds, walks, roads, buildings, furnishings, piping systems, electrical systems and their equipment and contents, caused by leaks in the piping systems being installed or having been installed herein. They shall repair at their expense all damage so caused.

1.17 EMERGENCY REPAIRS:

The Owner reserves the right to make emergency repairs as required to keep equipment in operation without voiding the Contractor's guarantee bond nor relieving the Contractor of his responsibilities.

1.18 DEMOLITION:

A. Demolition, capping and rerouting shall be performed as shown and as required to accommodate new construction.
PART 2 – PRODUCTS

The specification of the mechanical products is detailed in the individual specification sections of Division 15.

PART 3 – EXECUTION

3.01 INSTALLATION INSTRUCTIONS:

A. The requirements of "mechanical" installation is detailed in the individual specification sections of Division 15. In addition the following general requirements shall apply:

1. Obtain Manufacturer's printed installation instruction to aid in properly executing work of installing equipment whenever such instructions are available. Submit three copies of such instructions to the Architect prior to time of installation for use of supervising the work.

2. Erect equipment in a neat and workmanlike manner. Align, level and adjust for satisfactory operation. Install so that connecting and disconnecting of piping and accessories can be made readily, and so that all parts are easily accessible for inspection, operation, maintenance and repair. Minor deviation from arrangements shown on drawings may be made, as approved by the Architect.

3.02 PROTECTION OF PIPING SYSTEMS:

A. It shall be the responsibility of the Contractor to install and maintain pipe and equipment which is reasonably clean and free from rust, dirt, scale, etc. Where necessary, the Contractor shall provide temporary airtight covers at all pipe and equipment openings.

B. Before turning the systems over to the Owner, all piping systems shall be thoroughly flushed of all scale and dirt. Drains shall be installed at the low points to facilitate flushing of the piping systems.

3.03 PROTECTION OF AIR HANDLING SYSTEMS:

A. The Contractor shall continuously maintain adequate protection to keep dirt and foreign matter from getting into the air handling system.

B. Ductwork shall not be left open for any extended period of time. Open section and open fittings shall be capped wherever they occur until such time as final connections are made to equipment, grilles, register, etc.

3.04 PROTECTION OF ELECTRICAL SYSTEMS:

Do not route liquid filled pressure and drain piping over electrical equipment, switchboards motor control centers and the like. When unavoidable, install galvanized drain pans to prevent liquid from dripping or squirting onto such equipment.

3.05 EXCAVATION AND BACKFILL:

A. See "Earthwork" section of the specifications for requirements. In addition, the following shall apply:

1. Execute all excavation to grades to accommodate elevations indicated and where invert elevations are not indicated, provide minimum coverage (above top of pipes) as follows:

   a. Any piping under building slab (top of pipe to underside of slab) 18-inches.
b. Steel, cast iron, and copper in other locations 30-in.

c. Clay and Plastic piping in other locations - 36-in.

2. Excavation for pipes shall be cut a minimum of six-inches below the required grade. A six-inch bed of sand or other approved material shall be then placed and properly compacted to provide an accurate grade and uniform bearing throughout the length of the pipe, except for plastic piping for which sand shall be used.

3. Sand used shall be washed river sand normally used for backfill purposes, free of clods or lumps of clay, rock, debris and rubbish.

4. Backfilling shall not be placed until the work has been inspected, tested and approved.

5. PVC piping excepted, backfill to point 12-inches above top of piping with fine earth (excavated material may be used) free of excessive amounts of clay, debris, rubbish, rocks, or clods, as approved by the Architect. Backfill above 12-inches from top of piping may be with excavated material. Apply backfill by hand in 6-inch deep layers the full width of the trench. Moisten each layer (do not flood or puddle), and hand tamp to a minimum 90 percent compaction before proceeding with the next layer of backfill. Note: PVC piping shall be backfilled with sand to a point 12-inches above top of piping, remainder of trench may be backfilled with fine earth as specified above.

6. Clods or lumps one-inch in size or larger will not be permitted in the backfill. If the excavated material is not suitable adequate material shall be provided by hauling from other locations.

7. Surplus earth or material remaining after backfilling shall be removed from the site as indicated in Section entitled "Earthwork."

8. Do not excavate under or near foundations or footings except in manner permitted and approved by the Architect. Do not backfill until installed piping has been successfully tested and approved for backfill by the jurisdictional inspector and the Architect.

3.06 RECORD DRAWINGS:

A. The Contractor shall keep an accurate dimensional record of the as-built locations of all work under this Contract. This record shall be kept up-to-date at all times on blue line prints as the job progresses, and shall be available for inspection at all times.

B. Upon completion of the work, obtain from the Architect one complete set of reproducible prints of the applicable Contract Documents. Record all changes and information contained on the Record Drawings onto the new set of reproducible prints in an orderly and legible manner.

C. Submit two blueline prints of the completed reproducible Record Set for approval. Make such changes and correction as may be required for final approval.

D. When final approval is received, sign the reproducible Record Set and stamp or note "As-Built" and submit to the Architect.

E. Final observation will not be made until these approved as-built drawings have been received by the Architect.

3.07 CUTTING AND PATCHING:

A. Perform all cutting and fitting required for work of this Section in rough construction of the building.
B. All patching of finished construction of building shall be performed under the section of specification covering these materials.

C. All cutting of concrete work by this Contractor shall be by core drilling or concrete sawing. No cutting or coring shall be done without first obtaining the permission of the Architect.

D. Information regarding requirements for openings, recesses, chases in the walls, partitions, framing or openings shall be provided for work under the appropriate sections of the specifications in advance of the work. Should this be neglected, delayed or incorrect and additional cutting is found to be required, this work shall be accomplished at no additional cost to the Owner.

E. All access panels shall be approved by the Architect as to location, appearance, and finish.

3.08 VIBRATION ELIMINATION AND CONNECTORS:

Rotating or reciprocating mechanical equipment shall be mounted on or suspended from vibration isolators to prevent vibration and structural borne noise transmission to the building. Refer to each mechanical trade section of these specifications for specific details. Flexible duct connection shall be used between all fan openings and sheet metal work. Flexible connectors shall be used in piping connections to rotating or reciprocating equipment. See individual mechanical sections for specifications.

3.09 REQUIREMENTS FOR FINAL INSPECTION:

A. All of the following items must be completed prior to final inspections. No exception and no final payment will be made until all items are completed and approved. For specific requirements see the individual section in the Division 15 Category.

1. Cleaning equipment and premises
2. Test and balance of systems
3. Test and balance reports are reviewed by the Engineer
4. Service manual
5. Pipe and valve identification
6. Pipe and valve identification schedule
7. Operation tests
8. Operating instructions
9. As-built drawings
10. Certification of water sterilization

3.10 EARTHQUAKE RESTRAINT:

A. General:

B. All earthquake resistant designs for mechanical equipment, such as air handling units, water heaters, blowers, motors, ductwork, mechanical and plumbing piping, shall conform to the regulations of the California Building Code.
C. The restraints which are used to prevent disruption of the function of the piece of equipment because of the application of the horizontal force shall be such that the forces are carried to the frame of the structure in such a way that the frame will not be deflected when the apparatus is attached to a mounting base and equipment pad, or to the structure in the normal way, utilizing the attachments provided. Equipment, piping, ductwork, etc. shall be secured to withstand a force in any direction equal to the value shown in Table 16.

D. Piping:
   1. All HVAC and Plumbing piping shall be secured by bracing at every fourth hanger transversely and every eighth hanger longitudinally. Bracing shall be done in accordance with the NFPA Code, and as described in paragraph "Sway Bracing for Protection Against Earthquakes," of that code.
   2. As approved by code authority, the SMACNA “Guidelines for Seismic Restraints of Mechanical Systems” may be used as a guide.

E. No sway bracing is required for pipes that are installed on very short hangers (12-inches or less).

F. As approved by the code authority a bracing system as manufactured by "Superstrut" or "Pipe Shields Inc." may be used.

3.11 ADJUSTMENTS OF SYSTEMS AND OPERATION TESTS:

A. When the work included in these specifications is complete, and at such time as directed by the Architect, the Contractor shall adjust all parts of the systems, advising the Architect when this has been done and the work is ready for their final tests. Refer to "Balancing and Testing Procedures" in Section 15800.

B. The Owner may require operation of parts or all of the systems prior to final acceptance. If it becomes necessary for temporary use of the systems before all parts are complete, the Contractor shall adjust all parts as far as possible in order to make such temporary use as effective as possible. After temporary use and before acceptance tests, all systems shall be readjusted to meet permanent operational requirements. This occupancy shall not be construed as final acceptance cost of utilities for such operation will be paid by the Owner.

C. Operation Test:
   1. At completion, the Contractor shall operate all mechanical systems for a period of at least one eight-hour day to demonstrate fulfillment of the requirements of the contract. During this time all adjustments shall be made to the equipment until the entire system is in satisfactory operating condition acceptable to the Architect and the Owner.
   2. Final Operation and Instruction: Upon completion of the installation of the equipment and after final acceptance, at a time approved by the Owner, the Contractor shall place a competent person at the building who shall operate the systems for a period of one eight-hour day instructing the Owner's Representatives in all details of operation and maintenance.
   3. Any required instructions from manufacturer's representatives shall be given during this period. The one day specified under “Operation Test” does not substitute for this day of final operation and instruction.
   4. All arrangements for operation periods shall be made through the Owner, and the Architect.

D. For specific requirements see individual Mechanical Sections.

3.12 RUBBISH REMOVAL AND CLEANING:
Upon completion of the work under this section, the Contractor shall remove all surplus materials, equipment and debris incidental to their work, and leave the premises clean and orderly.

3.13 SERVICE:

Ninety (90) days free service shall be provided after completion of the job including changing of filters. Replacement filters shall be provided by the Owner and shall be on the job site.

3.14 PAINTING:

A. Excepting piping identification specified in the specific section all painting is specified in the Painting Section of the Specifications.

B. Surfaces to be painted shall be cleaned of cement, plaster and other spills.

C. Factory finishes shall be repaired to original condition when scratched or dented.

END OF SECTION
SECTION 15310
FIRE PROTECTION PIPING AND VALVES

PART 1 GENERAL

1.1 SECTION INCLUDES

1. Automatic fire sprinkler and standpipe system throughout the building.
2. Riser assemblies, hose valves and equipment.
3. The above is intended to describe, generally, the scope of work, but shall not be considered as a limit of work to be performed under this contract. All work necessary for complete operating fire protection systems with all fixtures and equipment, as required by authorities having jurisdiction, shall be performed under this section.

1.2 REFERENCES

1. NFPA 13 - Standard for the Installation of sprinkler systems.
2. NFPA 14 - Standard for the Installation of standpipe systems.
4. Valves: Bear UL and FM label or marking. Provide manufacturer’s name and pressure rating marked on valve body.

1.3 SUBMITTALS

2. Before submitting drawings to Fire Marshal for approval, submit shop drawings to Architect for review. Drawing shall include plans and sections showing layout of piping and layout of all heads.
3. After making corrections as indicated by Architect, submit complete shop drawings to local building department Fire Marshal for approval.
4. Upon receiving approval from Fire Marshal, submit four copies of approved drawings bearing stamps of above agency to the Architect for final review.

PART 2 PRODUCTS

2.1 MANUFACTURERS

1. Mechanical couplings and fittings:
   1. Victaulic.
   2. Gruvlok.
   3. Central-sprink.
2. Gate, globe and check valves:
   1. Victaulic.
   2. Stockham.
   4. United.
   5. Grinnell.

3. Butterfly valves:
   1. Demco.
   2. Centerline.
   4. Stockham.
   5. Milwaukee
   6. Victaulic.
   7. Grinnell.
   8. Kennedy.

4. Ball valves:
   1. Apollo.
   2. Walworth.
   5. Grinnell.

2.2 PIPE

1. Interior Sprinkler Piping:
   1. Sprinkler pipe shall meet ASTM A 795 or 135, and shall be UL Listed and FM Approved. All pipe shall have a Corrosion Resistance Ratio (CRR), of 1.00 or greater per the UL Listing. All piping shall be black carbon steel.

2. Exterior piping (underground):
   1. Cement lined ductile iron water main.
   2. P.V.C. Class 100 pressure pipe, AWWA, C90.

2.3 PIPE FITTINGS

1. General: fittings used in sprinkler systems shall meet or exceed the following standards: Cast iron threaded fittings, class 125 and 250 - ANSI B16.4, cast iron pipe flanges and flanged fittings - ANSI B16.1, malleable iron threaded fittings class 160 and 300 - ANSI B16.3, factory made wrought steel buttweld fittings - ANSI B16.9.

2. Fire department connection above ground:
   1. 150 and 300 class galvanized malleable iron, screwed.
   2. Underwriters' approved grooved end fittings and couplings.

3. Interior piping:
   1. Cast iron, standard weight threaded fittings.
2. Grooved end fittings with mechanical couplings.

4. Exterior Piping (Underground):
   1. Mechanical couplings with rubber gaskets.
   2. Bell and spigot with elastomeric ‘O’ rings.

5. Grooved End Fittings and Couplings:
   1. Fittings shall be designed for use with grooved-end pipe and couplings.
   2. Couplings, fittings and grooving methods utilized in piping system shall be by the same manufacturer.
   4. Couplings shall be mechanical type designed to engage and lock grooved pipe or fitting ends, form leak-proof joint.
   7. Bolts and nuts shall be track-head or oval neck type bolts with standard hexagon nuts, and heat treated carbon steel conforming to ASTM A183.
   8. Pressure Ratings: 300 p.s.i.

2.4 FLASHINGS AND SLEEVES

   1. Flashings for pipes through roofs:
      1. Provide counter-flashing sleeves.
      2. Other flashings shall be galvanized sheet metal.

   2. Sleeves; of following types as required:
      1. Schedule 40, galvanized steel pipe sleeves.
      2. Adjustable, telescopic metal sleeves: Similar to Adjus-to-crete.

2.5 VALVES, GENERAL

   1. Provide valves of same manufacturer for all similar applications. Valves to have manufacturer’s name and pressure rating clearly marked on outside of body and shall be U.L. Listed indicating valves.

   2. All valves controlling water supplies to fire systems shall be provided with tamper switch (see section 15340) and permanently marked identification sign.

   3. Provide valves rated not less than 175 psi water working pressure.

   4. All valves controlling sprinkler systems shall be installed so as to be operable from floor level.

2.6 SPRINKLER AND FIRE PROTECTION - U.L. APPROVED

   1. Bronze gate or globe valves, 2 in. and under:
      1. 175 psi wwp.
      2. Solid disc.
      3. Screwed bonnet.
4. Threaded end.

2. Iron gate valves, 2-1/2 in. and larger:
   1. 175 psi wwp.
   2. Rising stem.
   3. OS&Y.
   4. Solid Wedge disc/rubber encapsulated disc.
   5. Flanged or grooved ends.

3. Bronze check valves, 2 in. and under:
   1. Class 125, swing type, teflon disc.

4. Iron check valves, 2-1/2 in. and larger:
   1. 175 psi wwp.
   2. Swing check.
   4. Composition disc.
   5. Bolted cap.
   6. Flanged end.

5. Iron PIV gate valves, 4 in. and larger:
   1. 175 psi wwp.
   2. Non-rising stem for indicator post.
   4. Solid wedge disc/rubber encapsulated disc.
   5. O-ring packing.

6. Indicator posts:
   1. Vertical type for underground fire lines (with operating wrench). Stockham G-951-A.
   2. Wall type, straight type, with handsheet: Stockham G-950.

7. Iron Butterfly Valves, 4 in. and Larger:
   1. 175 PSI WWP.
   2. UL and FM approved for indoor and outdoor service.
   3. 410 SS stem.
   4. Aluminum bronze disc.
   5. Buna-N seat and O-ring.

PART 3 EXECUTION

3.1 INSTALLATION

1. Arrangement:
   1. Except for large scale details piping is diagrammatically indicated - install generally as shown.
   2. Do not scale Drawings for exact location of piping.
   3. Install piping to best suit field conditions and coordinate with other trades.
4. Maximize floor space and provide access to equipment in pump rooms by running suction, discharge and test lines from pumps vertically before transition to horizontal plane.
5. Do not sleeve structural members without consent of Architect.

3.2 PIPE JOINTING

1. Unions: Provide unions or flanges to render all items in system easily removable, including:
   1. Valves.
   2. Pumps.

2. Pipe Ends:
   1. Perform pipe cutting and end preparation to result in clean ends with full inside diameter.
   2. Grind and ream as necessary.

3. Threaded Joints:
   1. Sealed with approved sealant compounds or teflon tape.

4. Welded Joints:
   1. Welding of piping shall be done by welders who have been qualified by recognized agency within 6 months prior to date of Contract:
   2. Perform welding in accordance with provisions of latest issue of all applicable codes including:
      1. AWS D10.9, Level AR-3.
      2. ANSI Code for Pressure Piping.
   3. Where required, peen and wheel-grind welds.

5. Grooved End Joints:
   1. Perform following in accordance with manufacturer’s instructions.
   2. All pipe grooving and cutting shall be in accordance with manufacturer’s latest published recommendations. When a mechanical grooved piping system is used, all components shall be of the same manufacturer.

3.3 FLASHING AND SLEEVES

1. Flashings: Flash and counterflash watertight all pipe penetrations of roofs and exterior walls.

2. Sleeves:
   1. Through exterior concrete walls below grade, schedule 40, galvanized steel pipe sleeves.
   2. Seal annular space between pipe and sleeve water tight with one of the following:
      1. Thunderline Link-Seals.
      2. Oakum sealed in with mastic.
   3. Provide membrane clamps at penetrations of membranes on exterior decks or roof areas.
4. Packing through fire rated partitions: use sealant approved by authority having jurisdiction.

3. Maintain required clearance around all pipes passing through walls, floors, platforms and foundations. When required the clearance may be filled with non hardening caulking.

3.4 INSTALLATION, GENERAL

1. Install valves with stems upright or horizontal, not inverted.

2. All main control valves shall be provided with permanent identification as to portion of system controlled.

3. Provide drain valves at main shut-off valves, low points of piping and apparatus and elsewhere as required by code.

4. Locate valves to be accessible without climbing over equipment.

3.5 VALVE APPLICATIONS

1. Gate Valves: Shut-off, sectionalizing and isolation.


3. Butterfly valves: May be used in systems interchangeably in place of gate valves, except in fire pump suction lines.

3.6 FIELD QUALITY CONTROL

1. Test operate valves from closed-to-open-to-closed position while valve is under test pressure.

2. Test valve bonnets for tightness.

3. Check all valves for lubricant. Service valves which do not operate smoothly with suitable lubricant before placing in operation.

END OF SECTION
SECTION 15340
STANDPIPE AND SPRINKLER SYSTEMS

PART 1 GENERAL

1.1 SECTION INCLUDES
   1. Wet-pipe sprinkler system.
   2. System design, installation, and certification.
   3. Fire department connections.

1.2 REFERENCES
   2. NFPA 14 - Installation of Standpipe Systems.

1.3 SYSTEM DESCRIPTION
   1. System to provide coverage for entire building.
   2. Classification shall be ordinary hazard for entire building.
   3. Contractor to obtain volume and pressure of available water supply from certified water flow test data.
   4. Interface system with building fire and smoke alarm system.
   5. Provide fire department connections with number of inlet connections as required by Authority having jurisdiction.
   6. The above is intended to describe, generally, the scope of work but shall not be considered as a limit of work to be performed under this contract. All work necessary for a complete fire protection system, with all fixtures and equipment, shall be performed under this section.

1.4 SUBMITTALS
   1. Before submitting drawings to Fire Marshal for approval, submit shop drawings to Architect for review. Drawing shall include plans and sections showing layout of piping and layout of all heads.
   2. After making corrections as indicated by Architect, submit complete shop drawings to local building department Fire Marshal for approval.
   3. Upon receiving approval from Fire Marshal, submit four copies of approved drawings bearing stamps of above agency to the Architect for final review.
   4. Shop Drawings: Indicate hydraulic calculations, detailed pipe layout, hangers and supports, components and accessories. Indicate system controls.
   5. Product Data: Provide data on sprinkler heads, valves, piping and specialties, including...
manufacturers catalogue information. Submit performance ratings rough-in details, weights, support requirements, and piping connections.

6. Manufacturer’s Certificate: Certify that system has been tested and meets or exceeds code requirements.

7. Provide enameled steel sprinkler cabinet with two extra sprinkler heads of each type including each temperature rating and type used. Provide with Head Wrench.

PART 2 PRODUCTS

2.1 MANUFACTURERS

1. Valves: See Section 15310: FIRE PROTECTION PIPING AND VALVES.

2. Piping: See Section 15310: FIRE PROTECTION PIPING AND VALVES.

3. Alarm Actuating Devices:

   1. Acme Fire Alarm Co.
   2. Edwards Co.
   3. Gamewell Co.
   5. Potter Electric Signal Co.
   6. Potter Roemer.
   7. Victaulic.

4. Sprinkler Heads, Alarm Valves, Deluge Valves and related items:

   1. Viking.
   2. Grinnell.
   3. Reliable.
   4. Star.
   5. Gem.
   6. Central.

5. Pressure Gauges:

   1. Ashcroft.
   2. Potter Roemer Inc.
   3. Trerice.
   4. Weis.

2.2 PIPES AND FITTINGS

1. See Section 15310: FIRE PROTECTION PIPING AND VALVES.

2.3 VALVES

1. See Section 15310: FIRE PROTECTION PIPING AND VALVES.
2.4 FIRE DEPARTMENT INLET CONNECTION (FREE STANDING TYPE):

1. Cast brass angle body or red glossy polyester coated ductile iron angle body, 18 in. long polished brass seamless cover sleeve; cast brass identification base plate, cast brass pin lug plugs and chains on each pin lug swivel.
2. Two way, similar to Potter Roemer series 5760.
3. Provide appropriate lettering on plate.
4. Furnish optional polished brass trim.

2.5 DRAINS AND TEST PIPES

1. Drains:
   1. Fire department connection: auto ball drip if required.
   2. Provide valves and/or plugs as required at base of risers, on valved sections, at alarm and dry valves and at other required locations for complete drainage of systems.

   A. Inspectors Test pipes:
      1. Valved and piped to discharge through proper orifice.
      2. Provide at sprinkler connection to standpipe riser and at other required locations.

2. Pipe drain or test pipes to spill:
   1. To building exterior.
   2. Provide test pipe with sight glass, and pipe and drain to sprinkler drain riser. U.L./F.M. alarm test module similar to Victaulic testmaster may be used.

2.6 ALARM GONGS:

1. 10 in. diameter enamel steel bell, 120 volt; similar to Potter Roemer 6230 with bell: guard similar to Potter Roemer 6235.
2. Provide on building exterior at each fire department inlet connection.

2.7 PRESSURE GAUGES

1. Provide at incoming service entry point, floor control assemblies, and other required locations.
2. Similar to Potter Roemer 6240, 3-1/2 in. dia.

2.8 SPRINKLER HEADS

1. Cast brass, fusible link spray type with 1/2 in. discharge orifice.
2. Ordinary degree temperature rating, except as noted.
3. High temperature rating: where subject to abnormal heating conditions, such as in blast of heaters, near skylights, heaters, heating lines or emergency generators or in gaseous agent protected areas.
4. On exposed piping provide upright pendant heads.
5. In all rooms with ceilings run piping concealed with concealed heads with white cover.
6. Head Types:
   1. Similar to Reliable Model G1 Concealer.
   2. Semi-recessed pendent heads similar to Reliable Model G recessed, with escutcheon.
   3. Upright heads similar to Reliable Model G.

2.9 SPRINKLER CABINET
   1. Enameled steel with extra sprinkler heads including each temperature rating and type used.
   2. Provide on wall near main sprinkler valve.

2.10 FLOW SWITCH:
   1. Red tamper proof switch housing with flow paddle. Adjustable retard setting. Two single pole, double throw micro switches to operate separate circuits, 120V. AC type similar to Potter Roemer Series 6200.

2.11 TAMPER SWITCH:
   1. OS&Y gate valve use: Red tamper proof cover with "J" bolt mounting. Two double pole double throw microswitches. Similar to Potter Roemer No. 6220.
   2. Rising stem globe valve use: Red tamper proof cover with collar & mounting bracket. One single pole single throw microswitch. Similar to Potter Roemer No. 6221.
   3. Sprinkler system valve use: Red tamper proof cover with mounting bracket and water proof cable. One single pole normally closed micro switch. Similar to Potter Roemer No. 6222.

PART 3 EXECUTION

3.1 INSTALLATION
   1. Minimum cover underground piping: 30” per local codes.
   2. Accurately align sprinkler heads in hung ceiling areas symmetrically with diffusers, grilles, lighting fixtures and ceiling tiles.
      1. Install heads in center of tiles.
   3. Any sprinkler heads shown on the drawings are to indicate desired locations only and not to indicate actual locations quantities, coverage and code compliance.
   4. The contractor is responsible to provide actual quantities and locations of sprinkler heads and other required devices for code compliance with authority having jurisdiction.
   5. All sprinkler head locations, types, finishes etc. to be submitted for review by the architect prior to installation.
   6. Contractor shall check all conditions at the site and examine all pertinent drawings before preparing working drawings.
   7. Contractor shall take measurements for his own work, verify his drawings with drawings of other trades, and existing conditions and be responsible for proper installation in available space for
appurtenances herein specified and/or indicated on the drawings; and shall, before making any changes secure approval of Architect for such variations.

3.2 TESTS

1. The contractor shall perform all acceptance tests, complete the Contractor's Material and Test Certificate(s), and forward the certificates(s) to the authority having jurisdiction prior to asking for approval of the installation.

2. When the authority having jurisdiction desires to be present during the conduct of acceptance tests, the contractor shall give advance notification of the time and date the testing will be performed.

3. All interior wet systems subjected to system working pressure shall be hydrostatically tested at 200 psi and shall maintain that pressure without loss for 2 hours. Loss shall be determined by a drop in gauge pressure or visual leakage.

4. Portions of systems normally subjected to working pressures in excess of 150 psi shall be tested as described above at a pressure of 50 psi in excess of normal working pressure.

END OF SECTION
SECTION 15400
PLUMBING

PART 1 – GENERAL

1.01 ENERGY CONSERVATION:

A. Based on the latest edition of the California Energy Commission (CEC), the work will comply as follows:

1. The plumbing system equipment and fixtures shall meet the fuel type, input, volume, and quantity that are identical to the proposed design. The standard design shall assume recovery efficiency or thermal efficiency and standby loss as specified in Sections 111 or 113 of the Building Energy Efficiency Standards.

PART 2 – PRODUCTS

2.01 INSULATION:

A. Domestic hot water piping, hot water return piping, and 8 feet of cold water pipe at the water heating equipment shall be insulated with JM “Micro-Lok” Fiberglass, or equal with pressure sensitive closure system jacket. The conductivity range of the insulation shall be 0.24-0.28 BTU-IN/HR-SF-0F with a mean temperature rating of 1000F. See table below for thickness of insulation:

<table>
<thead>
<tr>
<th>Runouts</th>
<th>½” to 2”</th>
<th>2½” +</th>
</tr>
</thead>
<tbody>
<tr>
<td>½”</td>
<td>1”</td>
<td>1½”</td>
</tr>
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</table>

Insulation is equal to Johnson-Manville, Certain-Teed Fiberglass.

B. The insulation shall be applied over clean, dry pipe with all joints butted firmly together. The factory-attached tape shall be pasted smoothly over the insulation.

C. Fittings shall be insulated with Manville Products #301 cement to a thickness equal to the adjoining pipe insulation and finished with 4-oz. canvas pasted on or finished with "Zeston" premolded PVC insulated fittings.

D. Where piping is exposed to view, factory-applied 6-oz. canvas jacket or PVC jacketed shall be installed.

E. Toilet room fixture traps, drains, and hot water supply to wall of fixtures accessible to the handicapped shall be insulated with Handy Shield safety covers by Plumberex Specialty Products, Truebro Lav-Guard, or equal.

F. Condensate, condensate overflow piping, and sewer piping above grade, within building receiving cold condensate shall be insulated with JM Rubatex.

2.02 FITTINGS AND PIPING:

A. Soil, Waste, Vent, and Rainwater Piping Within the Building:
1. Above Grade:
   a. Cast iron “no-hub” conforming to CISPI 301 NSF listed with neoprene gasket and Type 301 stainless steel clamping device conforming to CISPI 310 with NSF listing.

1. Below Grade:
   a. Cast iron “no-hub” conforming to CISPI 301 NSF listed with neoprene gasket and Type 301 stainless steel clamping device conforming to CISPI 310 with NSF listing.

   **OR**

   b. ABS DWV with ABS fittings may be used as permitted by code.

   c. At contractor’s option, Bell and Spigot cast iron conforming to ASTM A74 with compression gaskets conforming to ASTM C564.

B. Domestic Water Piping:

1. Above Grade: Lead free Type L copper tubing hard drawn:
   a. Lead free wrought copper solder sweat fittings and lead-free solder.

2. Below Grade: Lead free Type K copper tubing hard drawn.
   a. Lead free wrought copper solder sweat tubing hard drawn.

C. Condensate Piping: Type "M" copper tubing, hard drawn with wrought copper or cast brass fittings, and 50-50 solder joints.

D. Fuel Gas Piping:

1. Above Grade:
   a. 2½” and Smaller: Schedule 40-A-53 black steel screwed pipe with black banded Class 150 malleable iron threaded fittings.

   b. 3” and Larger: Schedule 40-A-53 black steel screwed pipe with factory made wrought steel butt welded fittings.

   c. Exposed pipe shall be labeled every five linear feet.

2.03 PIPING SPECIALTIES:

   A. Unions: In copper tubing 3” and smaller, Lead free Nibco 733-LF, or equal.

   B. Flanges in copper tubing 4” and larger, Lead free, NIBCO or equal.

   C. Isolation Unions: Wilkins Lead free DUxLC 3” and smaller.

   D. Water hammer arresters in accordance with PDI-WH-201 standards, JR Smith 5000 Series PPP or equal. Install with access panel.
E. Floor drain trap primers:
   1. Trap Primer: Precision Plumbing Products, Inc. (PPP) "Prime-Rite" Model PR-500 automatic floor drain trap primer valve with corrosion resistant fittings and copper reservoir. Install PPP floor drain trap primer distribution unit DU-U Series as required. Install with access panel.

F. Gas Flexible Connector: Brass Craft one-piece construction, uncoated Type 304 stainless steel, cadmium-plated steel flare nuts, and fittings.

G. Fixture Supplies: Flexible stainless steel braided, compression fittings equal to Sanitary Dash, Speedway, or Brasscraft.


J. Escutcheons: 1” wide chrome or nickel-plated rust resistant.

2.04 VALVES:

A. Water:
   1. Ball Valves: Lead free NSF-61 certified sizes ½” through 2” Nibco T-585-80 LF/S-585-80LF, Apollo #77CLF, full port, bronze lead free.
   2. Check Valves:
      a. Silent check, 2-½” and smaller: Lead free NSF-61 certified class 125, bronze, Y-Pattern, horizontal swing, renewable disc, threaded or solder; Nibco T-413-Y-LF/S-413-YLF series or equal.
      b. Swing, 3”: Lead free NSF-61 certified class 125, iron body, bronze disc and seat ring Nibco F-910-LF or equal.
   3. Stops: Lead free angle or straight valve loose key with escutcheon at wall penetration. Stop and escutcheon shall be chrome plated T&S brass, Nibco or equal.
   4. Mixing Valve: Lead free under counter mixing valve for lavatory faucets, thermostatic tempering, one valve to serve one to four faucets equal to Powers e490 series, or Symmons.
   5. Master Tempering Valve and Automatic Balancing Valve System: Master tempering valve shall be constructed of solid brass with triple duty check stops and balancing poppet design, minimum flow rate of .5 gpm, adjustment range of 400°F to 1600°F, and feature minimum flow control to ASSE 1017. Automatic balancing valve assembly with temperature/pressure gauges, flow meter, volume control, and in-line check valves. System shall be equal to Leonard Valve LF Megatron.

B. Combination pressure and temperature relief valve: With minimum 3" extension, Wilkins,
Watts, or equal sized for proper pressure relief setting and BTU rating.

C. Gas Cocks:

1. 2” and Smaller: 125 PSI W.O.G., bronze body, square head, bronze plug and washer, NIBCO, Hammond, or equal.

2. 2-1/2” and Larger: 175 PSI W.O.G., semi-steel, lubricated plug, flanged, NIBCO, Nordstrom 143, Hammond, or equal.

D. Reduced Pressure Backflow Preventer (RPBFP): Lead free 175 PSI at 1400F, bronze body, celcon check seats, stainless steel relief valve seats, bronze body ball valve test cocks, nonrising stem gate valves (threaded for 3/4” through 2” and flanged for 2-1/2” through 10”), air gap drain fitting (route drain to receptor); Wilkins #975XL2 2” and smaller; #375XL 2½” and larger, or equal.

2.05 CLEANOUTS:

A. Cleanouts shall be manufactured by Zurn, J.R. Smith, Josam or equal.

B. Floor Cleanouts: Zurn ZN 1400-K-HD, J.R. Smith Fig. 4104-F-NB, or equal with satin nickel bronze non-skid adjustable round top, flashing device. For carpeted areas install carpet markers-C.

C. Wall Cleanouts: Zurn Z-1446, J.R. Smith Fig. 4532, or equal with stainless steel or chrome plated cover and screws.

2.06 FLASHINGS:

A. "Stoneman" No. 1100-4 or equal, four pound, seamless lead flashing assembly. Flashing shall have reinforced boot complete with cast-iron counterflashing sleeve and Permaseal waterproofing compound. All vent pipes shall be terminated 12” above the roof. (Roof penetrations per roofing inspector standards.)

2.07 HANGERS, SUPPORTS AND ACCESS PANELS:

A. Hangers and supports shall comply with the currently adopted edition of the California Plumbing Code and the IAPMO installation standards. Provide seismic support per the California Building Code. Manufacturers shall be B-Line, Unistrut, Tolco, or PHD.

B. Hangers and Supports:

1. Power driven anchors with concrete inserts are not acceptable.

2. Provide and install galvanized pipe saddle at hangers under pipe inserts for insulated piping.

3. Floor or Roof Supports: Pipe Pier by Erico or equal.

C. Access Panel for Valves, Water Hammer Arresters, and Trap Primers: Milcor, Elmdor, Karp, or equal painted steel, size as required for easy access, fire rated as required to match fire rating of wall assembly. Minimum size shall be 12" x 12”.

D. Fixture Supports: Furnish wall hung fixtures with supports by Zurn or J.R. Smith.
2.08 PLUMBING EQUIPMENT:

A. The equipment described in Part 2 of this Section shall be furnished and installed complete under this section of the specifications. See “Equipment Schedule” on drawings for size, capacity, and electrical characteristics.


C. Thermal Expansion Absorber: Provide at water heaters and boilers where there is a reduced pressure backflow preventor in the system, equal to Flexcon WH series, Amtrol ST series, Extrol, State ETC Series, Wilkins HXT series, or equal.

D. Water heaters installed in seismic zones shall be supported from the adjoining structure by the use of DSA approved safety restraint devices. Use QuickStrap from Hubbard Enterprises/HOPLRITE or Owner-approved equivalent.

2.09 PLUMBING FIXTURES:

A. General Requirements:

1. All fixtures shall comply with California Green Code requirement for maximum flow. Submit manufacturer's certification of compliance.

B. P-Traps, chrome plated drawn brass with 17 gauge tubing drain to wall. Trap arms under lavatories and escutcheon at wall shall also be chrome plated.

1. Supplies shall be with stops and flexible riser.

2. Traps above floor shall be tubular brass “P” traps with bronze nuts unless otherwise indicated.

2.10 SLEEVES:

A. General:

1. Where pipes pass through concrete, masonry, or stud walls, or pass through ceilings, provide rust-proof sleeves of the size required.

2. Provide UL-listed fire rated sealant (specialty products, or equal) at all penetrations of fire-rated assemblies and between buildings along property line.

PART 3 – EXECUTION

3.01 INSULATION INSTALLATION:

A. Install insulation after piping has been installed, tested, and accepted and after pipes are in a clean, dry condition. All joints in insulation shall be butted firmly together and sealed with jacket lap strip.

B. Apply insulation to all fittings and valve bodies. Flanges and unions shall not be covered.

C. Where the insulation supports the weight of the pipe, install a 12” insert of rigid galvanized steel, at each pipe clamp or hanger, an insert of rigid "Kaylo" 12” long, shall be installed.
between pipe and hanger. High density fiberglass inserts shall be installed with galvanized saddles.

3.02 PIPE INSTALLATION:

A. No-Hub Cast-Iron Soil Pipe Institute Handbook (Chapter 4) and the IAPMO IS-6.

B. Joints in copper tubing shall be made by first thoroughly cleaning the surface of the pipe and fittings, applying a copperized flux and sweating with lead free solder for all water piping and condensate piping above grade and below grade. Verify with lead free manufacturer’s the type of solder and flux that is compatible with their product.

C. All pipe shall be carefully cleaned before installation. The ends of threaded steel pipe shall be reamed out full size with a long tapered reamer so as to be partially bell-mouthed and perfectly smooth. Openings in pipes, drains, fitting apparatus and equipment shall be kept covered or plugged to prevent foreign substance from entering.

D. The grade of all sanitary sewers, storm drains and waste lines shall be as indicated on drawings. Sections of pipe shall be installed so as to provide smooth and uniform invert. Water shall not be allowed in the trenches while the sewer lines are being laid. Dirt, cement, or any other superfluous material shall be carefully removed from piping as the work progresses. Constant inspection shall be made of pipe and fittings during and after all installation for possible fractures and failures caused by installation. Backfill so as not to disturb pipe or jointing.

E. Flush out all water mains, sanitary and condensate drains with water so as to obtain free flow. Remove all obstructions and defects discovered. Remove and replace pipe already installed and found to be defective or which has had grade or joints disturbed at no additional cost.

F. Run piping free of traps, sags, or bends. Grade and valve for complete drainage and control of the system.

G. All piping shall be installed to maintain headroom and keep passageways and openings clear. Install piping parallel and straight with adjacent walls or ceilings to present a uniform appearance. All piping, except where noted otherwise on plans, shall be concealed in walls or above ceilings. Route piping to avoid electrical rooms. Do not route waste piping above kitchen areas. Do not route plastic pipe in return air plenums unless it is plenum-rated with a flame spread index of 25 or less and a smoke developed index of 50 or less.

H. ABS and PVC DWV piping shall be installed in accordance with IS5, IS9, and chapter 15 of the California Plumbing Code “Fire Stop Protection.”

I. Bending or forcing of pipe will not be allowed. Use fittings for all offsets or changes in alignment of piping.

J. Proper provision shall be made for expansion and contraction by means of fittings and anchors and supports of all piping.

K. Bushings and long screw fittings will not be allowed.

L. Install water hammer arresters at all flush valves, foot valves, dish and clothes washers and quick closing valves per PDI-WH-201 standards. The completed system shall be free of water hammer noise.
M. Unions shall be installed after each screw-type valve, connections for all equipment, appliances, and as required for erection and maintenance. No unions shall be installed in concealed locations. Unions are not required on installations using grooved joint couplings. Install isolation unions or waterway fittings on all connections between dissimilar metals.

N. No holes for pipe or equipment will be allowed in any structural members without written consent of the Architect. Where pipes are to pass through or interfere with any member, or where notching, boring or cutting of the structure is necessary, the work shall be done by the General Contractor as directed. Isolate pipe from coming in direct contact with the structure.

O. Unless otherwise specified herein, all equipment and fixtures shall be installed in accordance with the manufacturer’s printed recommendations.

P. Any minor changes in work, which has not been installed, shall be made by the Contractor without additional compensation, except changes which are caused by architectural revisions resulting in an increase or decrease of the size or quantity of the materials specified or indicated on the drawings. The Contractor shall submit an estimate of the cost of or credit for such changes which are not judged to be of a minor nature and shall proceed only upon the written authorization of the Architect.

Q. All piping shall be isolated from other piping, studs, ducts, any part of the building, framing, hangers, conduit, etc., with 1” strips of hair felt or pipe isolators.

R. For condensate piping, provide minimum 3” deep seal trap and plugged cleanout tee at the equipment connection. Slope piping at ⅛” per foot minimum.

S. For buried piping, backfill with sand 6” all around, tamp and backfill to grade as specified in Section 230050, "Excavation and Backfill."

T. Provide and install polished chromium plate split ring escutcheons for pipes exposed in the building.

3.03 CLEANOUTS:

A. Cleanouts shall be caulked into or clamped to pipe where shown on plans. Install under counter tops where they occur or in walls to avoid exposed condition. Cleanouts shall be accessible in all cases and shall be brought to surface on "Y" branches. All cleanouts shall be provided with removable floor or wall plate as specified in Part 2.

3.04 PIPE HANGER AND SUPPORTS:

A. Installation shall comply with the currently accepted edition of the California Plumbing Code.

B. Piping shall be firmly held in place by adjustable split ring malleable iron hangers, supports and pipe rests, located adjacent to fitting at each offset or change of direction, at the ends of branches over 5’ long, at base of riser pipes and along piping where necessary to prevent sags, bends, or vibration. All hangers and supports shall be of design which will support weight of pipe, fluid and insulation and prevent sagging.

C. Pipe clamps shall be heavy gauge iron, factory fabricated to fit against supporting surface when installed. Makeshift devices will not be acceptable. Plumbing tape is not allowed.

D. Seismically brace all piping and equipment as specified in Section 230050 and per California Building Code.
E. Hangers supported by concrete structure shall be attached by cast-iron manufactured concrete inserts installed at the time concrete is poured and each insert shall be provided with through rods lapped over structural reinforcing. Power driven fasteners are not acceptable.

F. Hangers supported by structural steel shapes shall be attached by cast-iron clamps designed for use on the specific steel shape and equipped with retainers.

G. All hangers shall be attached to halter rods by means of adjustable swivel, turnbuckle or double nut arrangement to allow height adjustment.

H. Vertical piping shall be suitably supported from the building structure where required by means of malleable iron or steel pipe clamps of ample size, either bolted or welded to the pipe and supported at the floor slab. Supports shall also act as anchors to allow for expansion and contraction of the piping. Provide rubber isolators for clamps where required for elimination of vibration and sound to the structure. Vertical "no-hub" components shall be secured at each joint and at each floor.

I. Miscellaneous Supports: Floor and wall brackets, etc., shall be provided where required in accordance with the best standard practice of the trade. In the event additional structural steel is required to transmit loads to maintain structure, same shall be provided at no additional cost to the Owner.

J. Support or piping, tubing, and equipment shall be accomplished by means of engineered products, specific to each application. Makeshift, field-devised methods shall not be allowed.

K. Horizontal Cast-Iron Piping:
   1. Supports shall maintain alignment and prevent sagging and shall be placed within 18" of the hub or joint. When the developed length between supports exceeds 4 feet, they shall be provided at each side of every joint. Supports shall also be provided at each horizontal branch connection. Suspended lines shall be braced to prevent horizontal movement as specified in Section 230050.
   
   2. Hanger rod sizes shall be in accordance with Table 313.6 of the California Plumbing Code.
   
   3. Trap arms and similar branches shall be firmly secured against movement in any direction. Closet bends shall be stabilized by firmly clamping and blocking. Where vertical closet stubs are used, they shall be completely stabilized against all movement.

L. The spacing of hangers for horizontal copper tubing and steel pipe shall be in accordance with Table 313.3 of the California Plumbing Code.

M. Support pipes on roof with pads and anchors per the roofing contractor.

N. ABS and PVC DWV hangers at 4’ on center at the end of the branch changes in direction and per the California Plumbing Code installation standards for PVC DWV and fittings IAPMO IS9-2003.

O. All hangers for water piping shall be sized for use over trisolator or 1-inch hair felt.

3.05 SLEEVES AND OPENINGS:

A. Provide standard weight black steel pipe sleeves for each pipe passing through foundation,
walls, partitions, roofs, and ceiling pipe sleeves shall be flushed with wall or floor.

1. Set pipe sleeves in place before concrete is poured.

2. For uninsulated pipe, provide sleeves that are two pipe sizes larger than the pipe passing through the opening, or provide a minimum of ½” clearance between inside of the opening and outside of the pipe.

3. For insulated pipe, provide sleeves of adequate size to accommodate the full thickness of pipe covering with clearance for packing and caulking.

B. Caulk the space between sleeve and pipe or pipe covering.

C. Finish and Escutcheons:

1. Smooth up rough edges around sleeves with plaster or spackling compound.

2. Provide escutcheons on all pipes exposed to view where passing through walls, partitions, ceilings, and similar locations.
   a. Size the escutcheons to fit pipe and covering.
   b. Hold escutcheons in place with set screw, or set in full bed of sealant.
   c. Where directed by Architect, paint escutcheon to match adjacent finish color.

D. Sleeve diameter for piping through a masonry wall above grade or through floors shall be #10 gauge galvanized sheet steel and shall extend completely through the walls or floor finishing flushed on both sides. The sleeve shall be 1” larger than the pipe with caulking to make the opening airtight.

E. Sleeves through the fire walls or floors shall be packed with UL Listed fireproof wicking or other suitable noncombustible material.

3.06 VALVES:

A. Provide valves in water and gas systems. Locate and arrange so as to give complete regulation of apparatus and fixtures.

B. Provide valves in at least the following locations:

   1. In branches and/or headers of water piping serving a group of fixtures.
   2. For flushing and sterilizing the system.

C. Locate valves for easy accessibility and maintenance.

3.07 WATER HAMMER ARRESTORS:

A. Provide water hammer arrestors on hot water lines and cold water lines.

   1. Install in upright position at all quick closing valves, solenoids, isolated plumbing fixtures, and supply headers at plumbing fixture group.
2. Locate and size in accordance with Plumbing and Drainage Institute Standard WH-201.

3. Install water hammer arrestors behind access panels or ceiling panels.

3.08 BACKFLOW PREVENTION:

A. Protect plumbing fixtures, faucets with hose connections, and other equipment having plumbing connections against possible back-siphonage.

B. Arrange for testing of backflow devices as required by the governmental agencies having jurisdiction.

C. Provide a reduced pressure backflow preventer at water connections for HVAC equipment, irrigation systems, and as required per code.

D. When supplying and equipment with make-up water and the water has been softened provide the following permanent sign at the backflow device: “Warning: Supplied by Soft Water.”

3.09 FIXTURE INSTALLATION:

A. All plumbing fixtures shall be bedded and caulked along joint at walls, counter tops, and other intersecting surfaces with white adhesive caulk.

B. Plumbing fixture trim and exposed supplies and “P” trap and arm shall be brass with polished chrome plated finish. Individual wheel handle, loose key stops, or, when so specified, screwdriver stops, shall be provided for all supplies, and unless integral with valves or faucets, or unless otherwise permitted, shall be mounted under the fixture. Exposed supplies and wastes to wall shall be provided with polished chrome plated brass wall escutcheons.

C. Fixtures with hangers or supporting arms shall have hangers or arms securely mounted on a ¼” thick x 6” wide steel wall plate which shall extend at least one stud beyond the first and last fixture mounting points. Concealed arm assemblies shall be attached to plates by four ⅜” x 1-¼” steel bolts and nuts, and hangers and exposed arms by 5/16” minimum full thread steel studs and jamb nuts. Plates shall be drilled and tapped at the time of fixture installation.

D. Wall plates shall be recessed flush with studs and shall be securely attached to each stud crossed. In steel stud construction, a 1-½” x 18” long furring channel shall be attached to each notched stud with fillet welds 1” long on 6” centers front and back. Plates shall be continuous fillet welded at both top and bottom to each furring channel. Provide backing for each plumbing fixture requiring same, at the time roughing-in is done.

E. Where drains are specified with clamping collars, the water proofing membrane and flashing shall be carefully cut to fit the drain, then anchored between drain and collar with rustproof bolts. See Part 2 for flashings.

F. Traps above floor shall be cast brass “P” traps with bronze nuts unless otherwise indicated.

G. Provide branch tailpieces off air vent lines where required.

H. Install stainless steel mounting ring as required for all flat rim sinks and lavatories installed in counter tops.

I. All fixtures designated for use by the disabled shall be in compliance with current applicable codes, Title 24, and California Disabled Accessibility guide book.
1. Water Closets: Installed height shall be a minimum of 17" and a maximum of 19" measured to the top of the toilet seat. Flush controls shall be operable by an oscillating handle with a maximum operating force of 5 lbf. The handle shall be located so it is operable without requiring excessive body movement.

2. Urinals: The elongated rim on urinals shall project a minimum of 14" from the wall and the height of the rim shall be at a maximum of 17" above the floor. Hand operated controls shall be mounted no more than 44" above the floor.

3. Lavatories: Lavatories shall be mounted with a clearance of at least 29" from the floor to the bottom of the apron with knee clearance under the front lip extending a minimum of 30" in width with 8" minimum depth at the top. Toe clearance shall be the same width and a minimum of 17" deep from the front of the lavatory. Hot water and drain pipes under lavatories shall be insulated. There shall be no sharp or abrasive surfaces under lavatories. Lever-operated faucet controls shall be operable with one hand and shall not require tight grasping, pinching or twisting of the wrist. The force required to activate controls shall be no greater than 5 lbf.

4. Drinking Fountains: The drinking fountain shall be a minimum of 18” depth. Provide clear and unobstructed space not less than 27” in height and 18” in depth, the depth measurements being taken from the front edge of the fountain. The bubbler shall be activated by a hand-operated lever type control located within 6” of the front of the fountain. The bubbler outlet orifice shall be located within 6” of the front of the drinking fountain and shall be within 36” of the floor. The water stream from the bubbler shall be substantially parallel to the front edge of the drinking fountain.

J. Fit-up connections to equipment (furnished by others) shall be provided with valves, unions, flexible connectors, and adapters to make a final connection. Piping stubouts for equipment will be extended to make the final connection. The connection shall be made with devices recommended by the equipment manufacturer. Field verify exact point of connection prior to start of work.

3.10 SEISMIC RESTRAINT:

A. General:

1. Furnish and install seismic restraint for all piping, equipment, etc., installed under the contract. All restraints shall meet the requirements of the current California Building Code.

3.11 PROTECTION OF PIPING SYSTEMS:

A. It shall be the responsibility of the Contractor to install and maintain pipe and equipment which is reasonably clean and free from rust, dirt, scale, etc. Where necessary, the Contractor shall provide temporary airtight covers at all pipe and equipment openings.

B. Before turning the systems over to the Owner, all piping systems shall be thoroughly flushed of all scale and dirt. Drains shall be installed at the low points to facilitate flushing of the piping systems.

3.12 REQUIREMENTS FOR FINAL INSPECTION:
A. All requirements shall be completed prior to final inspections.

B. Thoroughly clean all parts of the piping, valves, and equipment. Exposed parts which are to be painted shall be thoroughly cleaned of cement, plaster, oil and grease spots. Such surfaces shall be carefully wiped and all cracks and corners scraped out.

C. Exposed metal work shall be carefully brushed down with steel brushes to remove rust and other spots, leaving a smooth and clean surface. Trap elements shall be removed during the cleaning and flushing period, after which they shall be replaced and adjusted.

D. Electrical device covers shall not be installed until the finished coating of paint is completed. Device handles and receptacles shall be covered and/or protected during the painting operation to preserve the original factory bright new finish.

E. All potable water lines shall be sterilized with chlorine. The chlorine residual concentration shall indicate not less than 50 parts per million (ppm) and shall be retained for a period of not less than 24 hours. Repeat procedure if the residual concentration has decreased below 25 PPM. After test is in compliance with this specification, flush the system until the residual is not more than 0.5 PPM. All work and certification of performance must be done by qualified personnel. Submit certification to Architect.

NOTE: During construction phase, install Tee's and ball valves at locations directed and as required to facilitate sterilization and testing. Identify and indicate on the as-built plans the location of valves and ensure that they are accessible and are in a position not to cause cross-connections or artificial pressure loss in the system.

3.13 TESTS AND ADJUSTMENTS:

A. No piping work, fixtures, or equipment shall be concealed or covered until inspected by the Architect/Owner's Representative, who shall be notified when the work is ready for inspection. All work shall be completely installed, tested as required by local code, this section and the State Ordinances and State Safety Orders, and shall be leak-tight before inspection is requested. All tests shall be repeated as required by those making the inspection.

B. All domestic water piping shall be flushed out, tested at 150 psig and shall be left under pressure of supply main or a minimum of 50 psi, whichever is greater, for the balance of the construction period. No air testing is allowed. Tests are to be applied for a minimum period of one hour. Final pressures at the end of the test period shall be not more nor less than that caused by expansion or contraction of the test medium due to temperature changes.

C. Soil, waste, vent, condensate and storm drain piping within the building shall be tested with a minimum of 10-foot head at each joint for a minimum of 3 hours with no loss in head.

D. Fuel Gas Piping Tests: Above grade steel piping: Blow all piping with compressed air and test at 10 psig for one hour. For welded piping and for piping carrying gas at pressures in excess of 14” water column pressure, the test pressure shall be 60 psig and held for one hour. Soap test all joints in addition to the gauge test.

E. Plumbing fixtures shall be filled with water and checked for leaks and retarded drainage flow. Faucet aerators and shower heads shall be removed and cleaned thoroughly and flow shall be adjusted to eliminate dripping or splashing.

F. Final pressures at the end of the test period shall be no more nor less than that caused by expansion or contraction of the test medium due to temperature changes.
G. All protective coating systems shall be visually inspected for breaks in the coating system, any holidays revealed shall be promptly repaired per manufacturer’s instructions for repair of damaged pipe coatings.

3.14 DRAWINGS OF RECORD:

A. In addition to the “As-Built” drawings required, two complete sets of blue line mechanical drawings shall be provided by the Architect for the purpose of showing a complete picture of the work as actually installed.

B. These drawings shall serve as work progress report sheets and the Contractor shall make all notations, neat and legible, thereon daily as the work proceeds. The drawings shall be available for inspection at all times and shall be kept at the job at a location designated.

C. At the completion of the work, these as-built drawings shall be signed by the Contractor indicating approval thereof, dated and returned to the Architect.

D. The dimensions, locations and invert elevations of buried piping shall be accurately recorded on the as-built drawings. Dimensions shall be from permanent building walls (not from column lines).

3.15 GUARANTEE:

A. All work under this section shall be guaranteed in writing in accordance with the “Mechanical General Provisions,” Section 230050.

B. All material except as otherwise noted shall be new, free from defect and of the quality and rating shown or specified.

C. Any defect due to missing or improper material or faulty workmanship existing or developing during the warranty period shall be corrected and the resulting damage repaired.

D. The warranty period shall be one year from date of acceptance of the project, except for items guaranteed by the manufacturer for a longer period.

3.16 OPERATING INSTRUCTION AND SERVICE MANUAL:

A. The Contractor shall carefully prepare an operating instruction and service manual for the entire system including all equipment, excepting Owner-furnished equipment. The manual shall be submitted for review to the Architect at least 30 days prior to completion of the work. Failure to submit manual will delay final inspection and acceptance of the work. Contents shall be bound in a durable loose-leaf binder, complete with index.

B. The following items shall be included in the manual. This list may not be complete and is to be used as a guide:

1. Part numbers of all replaceable items.

2. Manufacturer’s cut sheets and rating tables, including brochures on all fixtures, equipment and materials installed.

3. Oiling, lubrication and greasing instructions, including maintenance time schedule.

4. Test data on all equipment.
5. Serial numbers of all principal pieces of equipment.

6. The names, addresses, phone and emergency phone numbers of the manufacturers’ and subcontractors’ suppliers.

7. Valve chart indicating location of valves for the project.

8. Written guarantee.

9. Prints of complete as-built drawings, signed by the Contractor.

10. Reviewed submittal data and shop drawings in binder.

11. Test and balance data and copies of building inspections check lists signed off by the Inspector.

12. Potable water piping sterilization certificate.

13. Pipe and equipment identification schedule.

C. After review of the manual by the Engineer, two copies of each manual shall be furnished for distribution.

3.17 IDENTIFICATION OF PIPING AND EQUIPMENT:

A. Identify all equipment with nameplates bearing equipment name and number using 1-½” wide, white Bakelite with ½” black letters permanently mounted in a conspicuous place.

B. Markings: Each piping system shall be identified and the direction of flow indicated by means of legends, color bands and flow arrows, all as manufactured by W.H. Brady, Seton or equal. The markings shall be applied after all painting and cleaning of the piping and insulation is completed. The stick-ons shall be taped all around the pipe in addition to being cemented on.

C. Location:

1. The identification shall be applied to all piping except those located in furred spaces without access to permit entrance of personnel and piping buried in the ground or concrete.

2. The symbol and flow arrow shall be applied at all valve locations, at all points where piping enters or leaves a wall, partition, cluster of piping or similar obstruction and at approximately 30-foot intervals on runs with at least one symbol or flow arrow in each space or room.

3. Variation or changes in locations and spacing may be made only with the direction of the Architect to meet conditions.

4. Wherever two or more pipes run parallel, the printed symbol and other markings shall be applied in the same relative locations so as to be in either vertical or horizontal linearity, whichever the case may be.

5. The markings shall be located so as to be conspicuous and legible at all times from any reasonable point.
D. Sizes shall be as recommended in ANSI A13.1.

E. As an alternate to the above, the Contractor may submit a system of painted stenciled letters on a color-coded background per ANSI A13.1. Complete data, color chart and sizes shall be submitted for review.

F. Valve charts shall be provided for each piping system and shall consist of schematic drawings of piping layouts showing and identifying each valve and describing its function. Upon completion of the work and after approval by the Architect, one copy of each chart, sealed to rigid backboard with clear lacquer placed under glass and framed, shall be mounted in the mechanical room where directed by the Owner. Two additional unmounted copies shall be delivered to the Owner. Valve lists shall be furnished as required.

G. Name Tags: Provide 1¼" plastic square of 1¼" round with ¼" letters for all valves, Seton or approved equal. Black letters on white tags and marked for type of service intended. Attach tags to valve handles by "S" hooks. Furnish four printed lists showing valve number, service and location. One of these lists shall be individually framed with metal frames and glass fronts and mounted where directed by the Owner after approval. One additional copy shall be furnished as required.

PART 4 – ABOVE GROUND FUEL OIL STORAGE TANK AND ACCESSORIES

4.01. GENERAL

A. Provide an integrated fuel system. The specification requires the detailed system design, equipment, installation, startup, and training to be the responsibility of a single specialized fuel system supplier. The specification section includes responsibility for mechanical, electrical, and control systems.

B. Provide complete, in place fuel storage system as indicated on the Drawings and specified herein, including but not necessarily limited to:

1. Fuel distribution pipe, valves and fittings
2. Protected class bulk storage tank
3. Fuel transfer and control – supply and return transfer system system with associated PLC controls.
4. Leak monitoring
5. Fuel system control wiring.
6. Startup of equipment by factory certified technicians.
7. All required permits, certifications, and inspection

4.02. SUBMITTALS

A. Provide manufacturer’s published data and product characteristics as indicated on the Drawings and as specified.

B. Submit with shop Drawings a list that indicates use, operating range, total range and location.
C. **Product Data:** Submit manufacturer’s product literature including, material specifications and other information required demonstrating compliance with specified requirements for following items:

1. Bulk storage tank, UL 2085 listed.
2. UL 508 PLC based control panel.
3. Leak Detectors
4. Ball valves, check valves
5. Flow restrictors
6. Level Switches
7. Double Contained Fuel Piping
8. Supply pump
9. Pre-assembled Modular vertical mount Return pump

D. **Shop Drawings:** Submit AutoCAD tank shop Drawings for approval showing locations of all fittings, valves, devices, accessories, electrical diagrams and critical dimensions. Provide a piping and instrument diagram for the system including a complete bill of material/equipment list.

E. **Signage Plan:** Submit a signage plan indicating locations and sizes of all signage to comply with code and satisfy the local Fire Marshal.

F. **Shop Drawings:** Indicate system layout, pipe sizes, location of supports, elevations, and equipment mounting details. For fuel tank, indicate dimensions, vent sizes and location of all accessories including fill pipe, manways, tank supports, inventory sensor, and leak sensors.

G. **Product Data:** Provide data on pipe materials, pipe fittings, valves and accessories. Provide manufacturers catalog information for all equipment.

H. **Electrical System Design:** Provide Drawings and specifications that include the proposed conduit layout and wiring diagrams for equipment covered in this section that requires electrical connections. Indicate conduit size and material, number and size of wires, location of wiring in classified areas and location of intrinsically safe circuits and conduits.

I. **Control System Design:** Provide control system designs including electrical schematics, panel physical, and field wiring diagrams.

J. **Structural Design:** Provide Drawings for support and anchorage of remote fill panel and remote fill control panel. Piping shall be seismically supported. Provide a PE stamped seismic support design.

K. **Calculations:** Provide calculations for pump selection, pipe sizes, and pipe support requirements.

L. **Permit Applications:** Provide copies of all permit applications.
M. Factory Installer Certifications: Provide copies of factory-trained installer certificates for all products, controls, leak detection, piping, tanks, boots.

4.03. PROJECT RECORD DOCUMENTS

A. Record and submit actual location of piping system, wiring, conduit runs and system components. Include as-built wiring details and copies of programs residing in any control panels.

4.04. OPERATION AND MAINTENANCE

A. Operation Data: Include installation instructions and exploded assembly views.

B. Maintenance Data: Include maintenance and inspection data, replacement part numbers and availability, and service depot location and telephone number.

4.05. REGULATORY REQUIREMENTS

A. Equipment and installation necessary to accomplish the work specified herein shall comply with the latest revisions of the applicable federal, state, and local codes and regulations concerning underground or aboveground fuel storage and dispensing systems including but not limited to the following:


2. National Electric Code (NEC), Article 513

3. ASME B31.9 Building Services Piping

4. API 2000 Venting atmospheric and Low Pressure Storage Tanks

5. NFPA 30 Flammable and Combustible Liquids Code

6. NFPA 70 National Electric Code


8. Uniform Fire Code: Article 52, Article 79 and Appendix II-F

9. California Fire Code

10. Local Requirements

B. All work specified herein shall conform to or exceed the requirements of the above referenced with the requirements, codes, regulations and standards specified herein. Whenever the provisions of said publications are in conflict, the more stringent requirement shall apply.

4.06. QUALITY ASSURANCE

A. Materials, Installation and Workmanship:

1. Except as modified by governing codes, comply with the applicable provisions of the
following:


c. Comply with NFPA-70 “National Electric Code” for equipment, wiring, and conduit installed under this section.

d. All control panels on the project shall bear the UL 508 label.

e. Provide listing/approval stamp, label, or other marking on equipment made to specified standards.

f. Contractors must be licensed to install tank systems. Contractor must have a record of at least 5 installations of similar size, scope and technical complexity. Fuel Oil Systems is a pre-approved contractor meeting all of these requirements.

g. Contractor must provide evidence (certificate of insurance) of $2 million pollution liability policy. The nature of this specialized trade drives the requirement for this policy.

h. Contractor must be a factory trained and certified installer for each product or piece of equipment. The contractor must submit the factory training certifications with the fuel system submittal.

B. Welding Materials and Procedures: Conform to ASME Code and applicable state labor regulations.

4.07. ACCEPTABLE MANUFACTURERS

A. Bulk storage tank, UL 2085 listed: Tiger Tanks, Modern Welding, Mission Critical Controls

B. UL 508 listed PLC controls: Mission Critical Controls (MCC), Fuel Oil Systems

C. Supply pump: FE Petro, Red Jacket

D. Pre-assembled Modular Vertical Return Pump: Mission Critical Controls (MCC), Fuel Oil Systems

E. Leak detectors: Mission Critical Controls, Gems, Fuel Oil Systems

F. Ball and Check Valves: Jomar, Nibco, Watts

G. Pressure Relief Valves: McDaniel, Watts

H. Float Switches: Mission Critical Controls, Fuel Oil Systems

I. Sight Flow Gauges: McMaster Carr, OPW, Mission Critical Controls
J. Vent Caps: Fuel Oil Systems, Mission Critical Controls, Morrison Brothers

K. Double Contained Piping: Brugg Flexwell

L. UL 508 listed control panel: Mission Critical Controls (MCC), Fuel Oil Systems

M. Flow restrictor: WA Kates

4.08. ABOVEGROUND BULK FUEL STORAGE TANK

A. General:
   1. Provide and install an aboveground fuel tank system complete with tank, piping, gauges, and other accessories specified herein to be part of a fully assembled system.

B. Storage Tank:

C. Manufacturers: Tiger Tanks, Modern Welding, Containment Solutions
   1. Tank Characteristics:
      a. Double Wall
      b. UL 142 listed.
      c. UL 2085 listed.
   2. Product Storage:
      a. Tank shall be capable of storing petroleum with specific gravity up to 1.1.
      b. Tank shall be individually vented to atmospheric pressure. The tank is not designed as a pressure vessel.
      c. Tank shall be capable of storing gasoline or diesel fuel at temperatures not to exceed 150 degrees F.
   3. Tank Design Criteria:
      a. Tanks shall be welded steel and epoxy painted meeting the requirements of UL 142 and UL 2085. Tanks shall be protected class tanks under the Uniform Fire Code. Tanks shall have the thermal insulation capabilities specified under UL 2085.
      b. Tanks shall be designed to pass an on-site pressure test of 5 psi in accordance with UL standards.
      c. Tanks shall be capable of supporting:
         (1) Tank shall support accessory equipment according to tank manufacturer's recommendations and limitations.
         (2) Chemical Resistance: Manufacture tank with materials chemically inert to petroleum products and capable of storing petroleum products with specific
d. Support of Accessory Equipment: Construct tank to support specified accessory equipment such as heating coils; drop tubes, submersible pumps, and ladders.

e. Annular Space: Provide space between primary and secondary tank shell walls to allow for free flow and containment of any leaked product from primary tank. Include monitoring fitting and space between tank shell walls to allow insertion of product monitoring device.

f. Manways (where applicable): Flanged, 22-inch I.D. complete with gaskets, bolts, and covers.

g. Tank top sumps. Furnish tank with secondary containment sumps. Seal pipe and conduit entries with UV resistant flexible entry boots.

h. Tanks top sumps shall be leak detected.

i. Furnish aluminum “shoe box” style sump lids.

j. Gauge Plates: Install steel plates installed under each service fitting and manway opening.

k. Furnish at least 4 spare fittings beyond those required for the base installation. Provide and install blind flanges as required.

D. Fitting Size: 2 or 4-inch diameter, NPT, half couplings at tank openings with reducers for smaller sizes where required.

E. Monitor Fittings: Provide one fitting on secondary tank near one end of tank.

F. Tank Identification:

1. Provide stencil, label or plate on exterior of tank which includes the following:

   a. Name of manufacturer

   b. Description of standard of design by which tank was manufactured

   c. Year in which tank was manufactured

   d. Unique manufacturer’s identification number

   e. Dimensions, model number of tank, design and working capacity

   f. Venting capacities

G. Factory Testing Requirements (to confirm tank tightness and strength):

1. Internal Load: Test primary and secondary tanks to withstand 5 psi maximum air pressure.

2. Test: Every tank shall be pressure tested by the tank manufacturer to assure structural integrity. Tank shall be tested to meet minimum requirements of U.L.

H. Suction and Return Tubes: Schedule 40 black steel and field installed by Contractor to within 6 inches of tank bottom; fit into flange with location as shown on Drawing.

I. Environmental Protection:

1. Gauge plates shall be installed under each tank fitting.
2. Tank shall have one monitor fitting penetrating outer wall.
3. Tanks shall have a space between the primary and secondary shell walls to allow for the free flow and containment of leaked product from the primary tank.

4.09. ABOVEGROUND STORAGE TANK ACCESSORY EQUIPMENT

A. Product Label: NFPA required stickers and "no smoking signs" for product being stored.

B. Overfill prevention valve: Provide as specified, complete with spill bucket or remote fill panel.

C. Atmospheric Vent:

1. Diesel or Fuel Oil:
   a. Provide an upward flow vent cap with a flame retardant 40-mesh screen. Vent should be installed a minimum 12 feet above grade as shown on project Drawings – mushroom style by Mission Critical Controls or equal.
   b. Provide emergency vent caps as per tank manufacturer recommendation.

4.10. FUEL DISTRIBUTION PIPE AND PIPE FITTINGS, ABOVEGROUND

A. General:

1. Provide and install Brugg double contained 316L stainless steel piping aboveground as indicated on the Drawings

B. Design Criteria:

1. Double Contained Stainless Steel Fuel Pipe: 316L stainless primary within 316L stainless steel secondary with scuff guard.
2. Fittings: Brugg Stainless Steel, closed end style
3. Finish: Factory furnished scuff guard
4. Unions: 300 lb. malleable iron threaded unions. Threaded joints are to be kept to a minimum.
5. Ball Valves: Bronze three-piece or one-piece body, stainless steel ball, Teflon seats and stuffing box ring, lever handle and balancing stops, threaded or flanged end.

4.11. SUPPLY AND RETURN TRANSFER PUMP CONTROL PANEL
A. Provide and install an UL 508 listed PLC control panel, programming and testing.

B. The PLC shall monitor leak detectors in addition to providing automatic control of the supply and return pumps. Hard wired high limit contacts shall be wired to stop the return pump upon a bulk tank high level. Hard wired high limit contacts shall be wired to stop the supply pump upon a high level in the belly tank.

C. Provide (ship loose and field install), single float switch for bulk tank high level safety.

D. Integral to the control panel, furnish status lights as shown on drawings.

E. Control panel shall be furnished with HOA switches for the supply pump and return pump. HOA switch positions shall be monitored by the PLC and alarm when not in the auto position. Control panel shall be furnished with motor starters with adjustable thermal overloads.

F. Control Panel Design Criteria:

1. Enclosure: Nema 4, welded steel enclosure with a liquid tight base. Cabinet interior shall be primed and finished in a chemical resistant enamel. Cabinet exterior shall be primed and finished in durable chemical resistant, textured gray enamel, suitable for industrial environments. Black phenolic labels with engraved white lettering shall identify all cabinet front devices.

2. Programmable Logic Controller: PLC shall be modular in nature and shall be capable of expansion through expansion cards or modules.

3. Control panel shall have a control power on/off light and power on/off switch. Control panel shall have an explosion proof horn mounted on its side.

4. Electronics: All cabinet wiring shall be run in NEMA approved covered wireways (2-inch-wide minimum), and terminate at a numbered terminal strip to facilitate field connections to remote equipment. All wires shall be tagged with Brady shrink wire number labels. No fuses shall be allowed. All control circuits shall have micro, manually reset, circuit breakers (1, 3, 5 amp). Fuel oil pump motor starters with overload protection shall be multi-pole, 120-volt coil, NEMA sized to match the pump motors. Three pole circuit breakers shall have a 10,000-ampere interrupting capacity.

a. System Functions:

   (1) Leak Monitoring: Leak detection sensors shall be provided for installation in each containment area and as indicated on Drawings. The sensor shall set off an audible and visual alarm on the control panel and the control panel shall alarm to the BMS via Modbus or dry contact. Leak detectors shall be installed as shown on the Drawings.

   (2) Pump/Level Control: The system will automatically control the belly tank level. Level control shall be decoupled from generator operation.

2. Quality Assurance:

   a. Installation shall be in strict accordance with manufacturer’s instructions. Manufacturer shall supply factory start up and calibration to be executed as needed during installation for the complete Fuel Oil Handling System, and after installation to train Owner’s personnel. The Installing Contractor shall not waive this requirement.
b. Electrical components shall be functionally tested with all Tank functions and controls. A certificate of factory testing, together with a copy of the wiring diagram shall be placed in the control cabinet prior to shipment.

4.12. ACCESSORIES

A. Description:

1. Spill Bucket: 4-inch size fill box and spill container with 5-gallon liquid capacity, quick opening cover, high speed internal drain, inner cap and thread-on riser connection (Model 1C-2100).

2. Foot Valve: line size double poppet type with cast iron body, replaceable bronze seats and 20-mesh screen.

3. Vent Head: 2-inch size, vertical type aluminum body with brass screen.

4. Overfill Prevention Valve: Shut-off valve with lower drop tubes (Model #61fstop).

5. Dispenser pump: Gasboy 1820 series

B. Antisiphon Valve: Magnatrol line size solenoid with manual override.

4.13. SPILL KIT

A. Provide a spill kit contained in 1 barrel.

B. Barrel one of the spill kit shall contain a 20-pound bag of particulate absorbent, 2 packages of absorbent "socks" 12 feet long and 100 absorbent pads. Barrel shall be plainly labeled and shall be easily accessible.

4.14. EXAMINATION

A. Verification of Conditions (by Installer): Examine conditions under which work is to be installed and notify Prime Contractor in writing of any conditions detrimental to proper and timely installation. Do not proceed with installation until unsatisfactory conditions have been corrected in manner acceptable to Installer.

4.15. PREPARATION

A. Regulatory Approvals:

1. Documents submitted to jurisdictional authorities.

2. This Contractor is responsible for obtaining permit for construction and for paying all fees and costs for all permits.

4.16. INSTALLATION

A. Provide labor and materials for a complete installation as shown on Drawings.

B. Coordinate with Owner's Representative and local authority having jurisdiction to allow witnessing of all aspects of installation and testing.
C. Comply with manufacturer’s printed instructions and recommendations for tank installation in addition to requirements listed in “Quality Assurance” article in Part 1 above.

4.17. FUEL CONTROL SYSTEM

A. Provide and install remote fill control panel.
B. Provide waterproof remote fill system with horn and light and overfill sign.
C. Route wiring and cables in conduit.
D. Provide fuel system control wiring from tank monitoring panel, including wiring between panel and remote sensors and alarm panel. All wiring shall be installed in conduit. Wiring shall be continuous with no splices and shall be labeled.
E. Install separate conduits for line and low voltage wiring.
F. Provide permanently mounted fill instructions inside the door of the remote fill panel.

4.18. PIPING INSTALLATION

A. Install in accordance with the manufacturer’s instructions and PEI/RP200.
B. Inspect all materials for signs of damage, and confirm compliance with specifications.
C. Avoid damage to piping materials or coatings during handling, installation and testing.
D. Provide non-conducting dielectric connections wherever joining dissimilar metals. Install to NACE RP-01-69.
E. Slope fuel oil and diesel oil piping no less than 1-inch per ten feet.
F. Provide adequate support for piping on 10-foot centers minimum.
G. Group piping whenever practical at common elevations.
H. Install piping to allow for expansion and contraction so that pipe, joints, or connected equipment will not be stressed.
I. Provide clearance for access to valves and fittings.
J. Protect piping systems from entry of foreign materials by temporary covers, completing sections of the work, and isolating parts of the completed system.
K. Install unions, couplings, valves, and flexible connectors in accordance with manufacturer’s recommendations.
L. Provide spill pans and spill pan calculations where required by the fire department.
M. Where required by the Local Authority Having Jurisdiction, provide an SPCC plan.
N. Pressure test all piping as per NFPA 30.
O. Label all piping for fuel oil service. Provide and install NFPA diamond on bulk storage tank.
4.19. ELECTRICAL SYSTEM

A. Indicate required power from branch circuit panel board and feeder from main distribution panel. Control Panel to be equipped with means of disconnecting all fueling system circuits per NFPA 70-514.

B. Design branch circuit conduit and wiring for equipment installed in this section. All wiring shall be designed and installed in strict accordance with NFPA 70. Division 16 contractor shall furnish line voltage power.

C. Provide detailed autocad as-built diagrams of the fuel system control wiring, including wire colors and numbers to aid in future troubleshooting of the system.

4.20. FIELD QUALITY CONTROL

A. Test fuel distribution system according to NFPA 30.

B. Replace leaking joints and connections with new materials.

C. Ensure all test reports are in form satisfactory to local governing authorities.

D. Final Installation Inspection:
   1. Contact local governing authorities of installation completion and make arrangements for final inspection by local governing authorities consisting of following;
      a. Testing alarm systems for proper functions.
   1. Perform all corrections identified by local governing authorities during final inspection and notify local governing authorities when any corrective work is scheduled to be completed to allow re-inspection by local governing authorities to confirm corrective work and complete installation is satisfactory.

E. Test and adjust fuel management and leak monitoring systems controls and devices. Replace damaged and malfunctioning controls and devices.

F. Submit reports of test and procedures in writing to the Engineer.

4.21. DEMONSTRATION

A. Train Owner’s maintenance personnel on procedures and schedules related to start-up and shutdown, troubleshooting, servicing, and preventive maintenance.

B. Representatives of equipment suppliers for the leak monitoring system shall provide necessary training and technical support to the Owner so that the Owner may properly operate and maintain the systems.

C. Provide a hardcopy training binder.

END OF SECTION
SECTION 15800
HEATING, VENTILATING AND AIR CONDITIONING

PART I - GENERAL

1.01 SUMMARY

A. The responsibilities of the Contractor shall include the following systems and equipment complete, and any additional work shown on the drawings or hereinafter specified.

- Air Cooled Condensing Unit
- DX Fan Coil Unit
- Unit Heaters
- Exhaust Fans
- Ductwork
- Duct and Pipe Insulation
- Variable Refrigerant Flow Air Conditioning Systems (VRF)
- Air Distribution
- Vibration Isolation
- Automatic Temperature Control
- Test and Balance

B. The Contractor shall provide all sheet metal work as shown on the drawings or as required for the mechanical systems. Sheet metal work shall be as specified in this section.

1.02 GENERAL REQUIREMENTS:

A. Reference to Other Sections: The applicable requirements from the following sections shall form a part of the heating, ventilating and air conditioning work and the Contractor shall consult them in detail for general and specific requirements.

Section 15050 General Mechanical Provisions
15400 Plumbing
15838 Vehicle Exhaust Systems

1.03 RELATED WORK:

A. The following work will not be furnished under this section of the specifications but will be furnished by other trades.

1. Power voltage wiring and connections thereto and all power voltage conduit.

2. Openings in walls, floor, roofs.

3. Louvers in doors.

4. Concrete work.

5. Cutting, patching and furring.

6. Flashing.
7. Final painting.

8. Equipment foundation pads.

9. Gas and condensate piping.

1.04 SHOP DRAWINGS:

A. Submit for approval, in accordance with Section 15050, six copies of fully dimensioned shop drawings for all specified equipment, controls and ductwork construction details. Manufacturer’s equipment drawings are to be complete with capacity and sound level ratings as indicated in the drawings or specifications. Contractor shall also submit all manufacturer’s internal wiring diagrams for electrical equipment and shall prepare other wiring diagrams showing the interlocking of the various controls and safety devices of the heating, ventilating and air conditioning systems. Submit performance curves for all fans (except propeller types and rooftop type) and for all water pumps 1 HP and larger. Equipment capacity tables requiring interpolation or extrapolation are not acceptable.

B. Submit for approval, installation drawings which show exact dimensions and locations of openings required in floors, roofs and walls for ducts, air intakes and exhaust, roof exhausters, piping etc.

C. For duct and piping shop drawing development, the contractor shall obtain the most the current architectural, structural and electrical CAD files to be overlaid on to mechanical duct and piping shop drawings.

1.05 FILTERS:

A. A complete set of filters shall be supplied for use during the construction, testing and balancing period. A complete set of new filters shall be installed after testing and balancing.

1.06 EQUIPMENT START-UP:

A. Provide the services of manufacturer’s factory-trained service representative to start-up VRF system, unit heaters, and split air conditioning units. Include in start-up, testing controls, demonstration of compliance with requirements, and replacement of damaged or malfunctioning controls and equipment.

PART 2 - PRODUCTS

2.01 DUCTWORK AND ACCESSORIES:

A. Supply ducts, return ducts, and exhaust ducts, plenum chambers, housing, panels, unless otherwise specified herein or on the drawings, shall be fabricated from zinc-coated (galvanized) steel sheets conforming to the latest ASTM specification A-653. Zinc-coating shall be of the “Commercial” class. Where gauge numbers of metals are indicated or specified, they shall represent the manufacturer’s standard gauge numbers, prior to galvanizing.

B. Volume Dampers:

1. Damper blades shall be manufactured of 16-gauge sheet metal.
2. Rectangular dampers shall be opposed blade type. Frame shall be 16-gauge galvanized steel. Where dimensions of duct exceed 18” x 12”, blades shall not be over 8” wide. Bearings shall be provided; holes punched in ductwork to serve as bearings will not be accepted. Locking quadrant sizes shall be as follows: Up to 40 square-inches shall be 1/4 quadrant; up to 18” x 12” shall be 1/2 quadrant, and over 18” x 12” shall be 1/2 quadrant.

3. Round dampers up to 9” diameter may be installed in sheet metal spin fittings when used for balancing air distribution devices. Frames for dampers 10” diameter and above shall be 16-gauge galvanized steel. Dampers above 20” diameter shall be reinforced. Quadrant sizes shall be as follows: up to 9” diameter shall be ¼ quadrant, 10” through 20” diameter shall be 1/2 quadrant, and over 20” diameter shall be 1/2 quadrant.

C. Fire Dampers Assemblies: Furnish and install all fire damper assemblies as required by the NFPA Pamphlet 90A and local authorities having jurisdiction. The dampers shall be approved and listed by the State of California Fire Marshal. Dampers shall be Style B curtain type complete with fusible link with 160° rating. Manufacturer shall be Pottorf, Ruskin, or Greenheck.

D. Fire/Smoke Assemblies: Furnish and install all fire and smoke damper assemblies as required by the NFPA pamphlet 90A and local authorities having jurisdiction. Dampers shall be complete with damper actuator activated by duct mounted smoke detector or fire stat. (Projects with central fire control panel shall have dampers provided with two damper position switches linked to damper blade.) The damper assembly shall be approved and listed by the State of California Fire Marshal. Manufacturer shall be Pottorf, Ruskin, or Greenheck.

E. Access Doors:

1. Duct access doors to all fire dampers and smoke/fire dampers shall be insulated type as manufactured by Duro Dyne, Pottorf, Karp or equal. Doors shall be 24-gauge metal, 24-gauge frame, insulation shall be 1” fiberglass, covered with 28-gauge metal, with loose pin hinges, and cam-lock latches. Door frame shall contain foam gasket, and a sponge rubber gasket shall be attached to back of each door frame to insure tight seal between duct and frame. Finish shall be factory applied. Service shall be stenciled on door, e.g., “Fire Damper” in 1/2 letters. Size shall be 16” by 12” where space and duct size permit. On small ducts and in restricted space, 12” x 10” may be used.

2. Access doors installed in round ductwork shall be rolled plate and shall be at least 2 gauges thicker than the gauge required for the duct. Doors shall be close-fitting with foam strip gasket and a minimum of 2 quick fastening latches. Doors for ducts up to 12” diameter shall be provided with 2 hinges and for ducts above 12” diameter provide one continuous hinge.

F. Flexible Connectors: Furnish and install connections at the point where ductwork casing connects to fans, and where shown on the drawings. Connectors shall be manufactured by Duro Dyne. Indoor flexible connectors shall be Noeprene #10003 MFN metal fab. Outdoor flexible connectors shall be Durolon #10002 MFD metal fab. Connectors shall be securely clamped to ductwork, fans and apparatus by means of bolted metal straps.

G. Flexible Ducts:
1. Flexible ducts shall consist of an exterior reinforced laminated vapor barrier, 1 1/2" thick fiberglass insulation (K = .25 ~ 75°F), encapsulated spring steel wire Helix and impervious smooth, non-perforated interior vinyl liner. Individual lengths of flexible ducts shall contain factory fabricated steel connection collars.

2. Flexible ducts shall be supported at or near mid-length with 2" wide, 28 gauge steel collar attached to the structure with an approved duct hanger. Installation shall minimize sharp radius turns or offsets. The maximum length shall be 7 feet and can be used at the terminal ends only, except that flexible ducts may be used to cross seismic joints without offsets.

3. Insulated low pressure flexible duct shall be Thermaflex MKE or approved equal.

2.02 REFRIGERANT PIPING AND ACCESSORIES:

   A. Refrigerant piping shall be seamless copper tubing, hard drawn, type K or L, conforming to ASTM B88.

   B. Fittings for copper tubing shall be wrought copper or bronze solder joint fittings conforming to ANSI B16 22.

   C. Moisture and liquid indicators shall be Sporlan See-All or equal for sweat joints. Refrigerant piping 2" and small shall have full line size indicators, and piping over 2" shall have the indicators mounted in “O.D.” bypass as recommended by manufacturer.

   D. Driers shall be Henry, Superior, or equal angle cartridge flanged type with solder connection and required drier cartridges for each unit.

   E. Strainer for refrigerant piping shall be Henry, Superior or equal angle or “Y” pattern with 100 mesh Monel screen reinforced with 10 mesh brass screen or equal.

   F. Valves 1½” O.D. and above shall be Henry, Superior, or equal, bronze alloy.

   G. Valves 1¼” O.D. and below shall be Henry, Superior, or equal, packless shut-off type.

   H. Solenoid valves shall be Sporlan or equal for sweat or screw joint connections as required. Coil housing shall have conduit connection. Valve shall be Underwriters’ Laboratories and CSA approved.

   I. Expansion valves shall be Sporlan or equal thermostatic type with removable power element, external equalizer connection, external adjustable super heat and remote bulb. Valve capacity shall be equivalent to or slightly exceed the tonnage of the system. Valve selection shall be in accordance with the manufacturer of the condensing equipment.

   J. All condensate drain piping and gas piping will be furnished and installed by Plumbing Contractor. Mechanical Contractor shall coordinate location and size of pipe connections with Plumbing Contractor.

   K. Pipe sizes for VRF equipment shall be to manufacturer’s recommendation and comply with 2013 CMC.

2.03 INSULATION:

   A. Install thermal insulation on clean, dry surfaces after testing, inspection, and approval in
strict accordance with these specifications, applicable drawings and contract documents and manufacturers’ recommendations. Except for materials listed below, all insulation and accessory materials are to meet NFPA requirement of flame spread not to exceed 25 and smoke developed not to exceed 50 as tested by Procedure ASTM-E-84, NFPA 225, or UL 723.

1. Excepted are:

(1) Flexible, closed cell, foamed plastic insulation (Armacell or approved equal) on water chilling units, copper tubing refrigerant piping, copper tubing runouts and drain lines only.

B. Duct Insulation: Insulate all concealed supply and return air ducts with flexible glass fiber insulation with factory applied reinforced foil kraft facing, Manville R-series Microlite FSKL or approved equal. 1½” minimum thickness, density 2.0 pcf. Installed “R” value of 4.2 in conditioned space and 8.0, in non-conditioned space.

C. Duct Liner: Ducts, where shown on the drawings shall be lined with 1½” minimum thickness, density 2.0 pcf, Manville “Linacoustic” or approved equal. The insulation shall not exceed k = .28 at 75°F mean temperature, installed R-value shall be 4.2 in conditioned space and 8.0 in non-conditioned space.

D. Refrigeration suction piping shall be insulated with ¾” thick “Armacell” by Manville or approved equal. Exterior pipe insulation shall be protected with aluminum jacketing.

E. All VRF piping insulation shall be in accordance with manufacturer’s recommendations and comply with 2013 CMC and 2013 CEC.

2.04 EQUIPMENT:

A. Air-Cooled Condensing Unit:

1. Furnish and install an air-cooled condensing unit in the location and manner shown on the plan. The unit shall be properly assembled and tested at the factory. It shall be designed for use with Refrigerant R134A. Units shall be Mitsubishi, Carrier or approved equal.

2. The unit shall operate down to 20°F outdoor air temperature entering condenser with standard controls.

3. Condenser coil shall be of nonferrous construction. Coil shall have aluminum plate fins, mechanically bonded to seamless copper tubes. Coil shall be circuited for subcooling. Coils require a phenolic coating for coastal protection.

4. Condenser Fans and Motors: Unit shall be furnished with direct-drive, propeller-type fans arranged for vertical discharge. Condenser fan motors shall have inherent protection, and shall be of the permanently lubricated type, resiliently mounted. Each fan shall have a safety guard. Controls shall be included for cycling fan(s) for intermediate season operation.

5. Compressor(s): Each shall be of serviceable hermetic design with external spring isolator and shall have an automatically reversible oil pump - compressor shall unload in response to suction pressure. Compressor shall be located in a section separated from condenser fans and coil. Multiple compressor units shall have step-
start fans and coils. Compressor motor(s) shall have (part-winding start), (across-the-line start).

6. Controls shall be factory wired and located in a separate enclosure. Safety devices shall consist of high and low pressure switches and compressor overload devices. Unit wiring shall incorporate a positive acting timer to prevent short cycling of compressor if power is interrupted. Timer shall prevent compressor from restarting for approximately 5 minutes after shut-off.

7. Casing shall make unit fully weatherproof for outdoor installation. Casing shall be of galvanized steel, zinc phosphatized and finished with baked enamel.

B. DX Fan-Coil Unit:

1. Unit construction shall be of heavy-gage, mill-galvanized steel panels, interlocked for ease of service. Panels shall be fully insulated with fire-retardant material in accordance with NFPA 90A. Units shall be Mitsubishi, Carrier or approved equal.

2. Refrigerant coils shall have aluminum fins mechanically bonded to copper tubes for high thermal efficiency. Coils shall be factory pressure-tested and shall have suction and discharge connections on the same end. Condensate drain pan shall extend under entire coil area and no modification to drain pan shall be required for horizontal or vertical applications. Evaporator fan section shall have one forward-curved, double inlet fan operating from a common shaft. Fan shaft shall be coated with Cosmoline or equivalent hydrocarbon rust inhibitor. Fan wheels shall be statically and dynamically balanced at factory. Fan shafts and wheels shall be constructed of mill-galvanized corrosion-resistant steel and shall be selected to operate at least 25% below the first critical speed and designed for continuous operation at maximum rated fan speed.

3. Drive components shall be enclosed within units. Access to motor and drive shall be provided by a removable panel of adequate size for removal of fan wheel, motor and drive. All unit sizes shall have variable-pitch drive which shall consist of a solid cast-iron fan pulley, variable-pitch motor pulley and V-belt(s). Drive shall be selected with a service factor of 1.5, based upon motor horsepower.

4. Motors shall be UL-approved, NEMA frame ball-bearing, drip-proof motors. Internal thermal protection shall be provided on motors up to 5 horsepower.

C. Exhaust Fans:

1. In-Line Fans:

   (1) Fan shall be factory assembled with square housing for in-line mounting in duct. Fans shall be Greenheck or approved equal.

   (2) Wheel shall be backwardly inclined centrifugal type constructed of steel or aluminum that has been statically and dynamically balanced.

   (3) The housing shall be constructed of formed steel, square shaped, with factory applied finish. One of the sides shall be hinged and shall support the motor and wheel assembly allowing the assembly to swing out for cleaning and inspection.

   (4) Drive shall be belt type. Motor shall be open drip-proof type with inherent
thermal protection. Provide belt guard.

(5) Ratings shall be in accordance with the appropriate A.M.C.A. approved test codes and procedures and bear the A.M.C.A. certified rating seal.

2. Ceiling Exhaust Fans:

(1) Ventilator shall have steel housing finished in baked enamel and insulated with at least \( \frac{3}{8} \)" acoustic insulation. Housing shall have adjustable mounting brackets.

(2) Automatic Backdraft Damper shall be located within duct connector, and shall have cushioned stops to prevent clutter. Damper/duct connector and wiring adapter plate shall be adjustable for either horizontal or vertical installation.

(3) Blower shall be removable and shall have a centrifugal blower type wheel. All motors are to be lifetime lubricated type, mounted with neoprene torsion mounts to isolate vibration. RPM not to exceed number listed for each model.

(4) Air Delivery shall be no less and sound levels no greater than listed for each model. All air and sound ratings shall be certified by AMCA. Units shall be UL listed.

D. Variable Refrigerant Flow Air Conditioning Systems (VRF)

1. System Description

(1) The variable capacity, heat pump heat recovery air conditioning system shall be a Mitsubishi Electric CITY MULTI VRF (Variable Refrigerant Flow) zoning system.

(2) The R2-Series system shall consist of a PURY outdoor unit, BC (Branch Circuit) Controller, multiple indoor units, and M-NET DDC (Direct Digital Controls). Each indoor unit or group of indoor units shall be capable of operating in any mode independently of other indoor units or groups. System shall be capable of changing mode (cooling to heating, heating to cooling) with no interruption to system operation. To ensure owner comfort, each indoor unit or group of indoor units shall be independently controlled and capable of changing mode automatically when zone temperature strays 1.8 degrees F from set point for ten minutes. The sum of connected capacity of all indoor air handlers shall range from 50% to 150% of outdoor rated capacity.

2. Quality Assurance

(1) The units shall be listed by Electrical Testing Laboratories (ETL) and bear the ETL label.

(2) All wiring shall be in accordance with the National Electrical Code (N.E.C.).

(3) The units shall be manufactured in a facility registered to ISO 9001 and ISO14001 which is a set of standards applying to environmental protection set by the International Standard Organization (ISO).

(4) All units must meet or exceed the 2010 Federal minimum efficiency
requirements and the proposed ASHRAE 90.1 efficiency requirements for VRF systems. Efficiency shall be published in accordance with the DOE alternative test procedure, which is based on the Air-Conditioning, Heating, and Refrigeration Institute (AHRI) Standards 340/360, 1230 and ISO Standard 13256-1.

(5) A full charge of R-410A for the condensing unit only shall be provided in the condensing unit.

3. Delivery, Storage and Handling

(1) Unit shall be stored and handled according to the manufacturer’s recommendation.

4. Controls

(1) The control system shall consist of a low voltage communication network of unitary built-in controllers with on-board communications and a web-based operator interface. A web controller with a network interface card shall gather data from this system and generate web pages accessible through a conventional web browser on each PC connected to the network. Operators shall be able to perform all normal operator functions through the web browser interface.

(2) System controls and control components shall be installed in accordance with the manufacturer’s written installation instructions.

(3) Furnish energy conservation features such as optimal start, night setback, request-based logic, and demand level adjustment of overall system capacity as specified in the sequence.

(4) System shall provide direct and reverse-acting on and off algorithms based on an input condition or group conditions to cycle a binary output or multiple binary outputs.

(5) Provide capability for future system expansion to include monitoring and use of occupant card access, lighting control and general equipment control.

(6) System shall be capable of email generation for remote alarm annunciation.

(7) Control system start-up shall be a required service to be completed by the manufacturer or a duly authorized, competent representative that has been factory trained in Mitsubishi controls system configuration and operation. The representative shall provide proof of certification for Mitsubishi CMCN Essentials Training and/or CMCN Hands-On Training indicating successful completion of no more than two (2) years prior to system installation. This certification shall be included as part of the equipment and/or controls submittals. This service shall be equipment and system count dependent and shall be a minimum of one (1) eight (8) hour period to be completed during normal working hours.

5. Warranty
(1) The units shall be covered by the manufacturer’s limited warranty for a period of one (1) year from date of installation.

   a. If the systems are:

      a) designed by a certified CITY MULTI Diamond Designer,

      b) installed by a contractor that has successfully completed the Mitsubishi Electric three day service course, AND

      c) Verified with a completed commissioning report submitted to and approved by the Mitsubishi Electric Service Department, then the units shall be covered by an extended manufacturer’s limited warranty for a period of five (5) years from date of installation.

In addition the compressor shall have a manufacturer’s limited warranty for a period of seven (7) years from date of installation.

If, during this period, any part should fail to function properly due to defects in workmanship or material, it shall be replaced or repaired at the discretion of the manufacturer.

This warranty shall not include labor.

(2) Manufacturer shall have a minimum of twenty-nine years of HVAC experience in the U.S. market.

(3) All manufacturer technical and service manuals must be readily available for download by any local contractor should emergency service be required. Registering and sign-in requirements which may delay emergency service reference are not allowed.

(4) The CITY MULTI VRF system shall be installed by a contractor with extensive CITY MULTI install and service training. The mandatory contractor service and install training should be performed by the manufacturer.

6. Products

(1) R2-SERIES Outdoor Unit:

   a. The R2-Series PURY outdoor unit shall be used specifically with CITY MULTI VRF components. The PURY outdoor units shall be equipped with multiple circuit boards that interface to the M-NET controls system and shall perform all functions necessary for operation. Each outdoor unit module shall be completely factory assembled, piped and wired and run tested at the factory.

      a) The model nomenclature and unit requirements are shown below. All units requiring a factory supplied twinning kits shall be piped together in the field, without the need for equalizing line(s). If an alternate manufacturer is selected, any additional material, cost, and labor to install additional lines shall be incurred by the contractor.
Outdoor Unit Model Nomenclature

<table>
<thead>
<tr>
<th>208/230 Volt</th>
<th></th>
<th>Twinning Kit</th>
</tr>
</thead>
<tbody>
<tr>
<td>Model Number</td>
<td>Units</td>
<td>Twinning Kit</td>
</tr>
<tr>
<td>PURY-P144TKMU</td>
<td>(1) PURY-P144TKMU</td>
<td>None</td>
</tr>
</tbody>
</table>

b) Outdoor unit shall have a sound rating no higher than 60 dB(A) individually or 64 dB(A) twinned. Units shall have a sound rating no higher than 50 dB(A) individually or 53 dB(A) twinned while in night mode operation. If an alternate manufacturer is selected, any additional material, cost, and labor to meet published sound levels shall be incurred by the contractor.

c) Both refrigerant lines from the outdoor unit to the BC (Branch Circuit) Controller (Single or Main) shall be insulated in accordance with the installation manual.

d) There shall be no more than 3 branch circuit controllers connected to any one outdoor unit.

e) Outdoor unit shall be able to connect to up to 50 indoor units depending upon model.

f) The outdoor unit shall have an accumulator with refrigerant level sensors and controls.

g) The outdoor unit shall have a high pressure safety switch, overcurrent protection, crankcase heater and DC bus protection.

h) The outdoor unit shall have the ability to operate with a maximum height difference of 164 feet and have total refrigerant tubing length of 1804-2625 feet. The greatest length is not to exceed 541 feet between outdoor unit and the indoor units without the need for line size changes or traps.

i) The outdoor unit shall be capable of operating in heating mode down to -4°F ambient temperatures or cooling mode down to 23°F ambient temperatures, without additional low ambient controls. If an alternate manufacturer is selected, any additional material, cost, and labor to meet low ambient operating condition and performance shall be incurred by the contractor.

j) The outdoor unit shall be capable of operating in cooling mode down to -10°F with optional manufacturer supplied low ambient kit.

k) Manufacturer supplied low ambient kit shall be provided with predesigned control box rated for outdoor installation and capable of controlling kit operation automatically in all outdoor unit operation modes.
l) Manufacturer supplied low ambient kit shall be listed by Electrical Laboratories (ETL) and bear the ETL label.

m) Manufacturer supplied low ambient kit shall be factory tested in low ambient temperature chamber to ensure operation. Factory performance testing data shall be available when requested.

n) The outdoor unit shall have a high efficiency oil separator plus additional logic controls to ensure adequate oil volume in the compressor is maintained.

o) The outdoor unit shall be provided with a manufacturer supplied 20 gauge hot dipped galvanized snow/hail guard. The snow/hail guard protects the outdoor coil surfaces from hail damage and snow build-up in severe climates.

p) Unit must defrost all circuits simultaneously in order to resume full heating more quickly. Partial defrost which may extend “no or reduced heating” periods shall not be allowed.

b. Unit Cabinet:

a) The casing(s) shall be fabricated of galvanized steel, bonderized and finished. Units cabinets shall be able to withstand 960 hours per ASTM B117 criteria for seacoast protected models (~BS models)

c. Fan:

a) Each outdoor unit module shall be furnished with one direct drive, variable speed propeller type fan. The fan shall be factory set for operation under 0 in. WG external static pressure, but capable of normal operation under a maximum of 0.24 in. WG external static pressure via dipswitch.

b) All fan motors shall have inherent protection, have permanently lubricated bearings, and be completely variable speed.

c) All fan motors shall be mounted for quiet operation.

d) All fans shall be provided with a raised guard to prevent contact with moving parts.

e) The outdoor unit shall have vertical discharge airflow.

d. Refrigerant

a) R410A refrigerant shall be required for PURY-P-T/Y(S)KMU-A outdoor unit systems.

b) Polyolester (POE) oil shall be required. Prior to bidding, manufacturers using alternate oil types shall submit material safety data sheets (MSDS) and comparison of hygroscopic properties for alternate oil with list of local suppliers stocking alternate oil for approval at least two weeks prior to bidding.
e. **Coil:**
   
a) The outdoor coil shall be of nonferrous construction with lanced or corrugated plate fins on copper tubing.
   
b) The coil fins shall have a factory applied corrosion resistant blue-fin finish.
   
c) The coil shall be protected with an integral metal guard.
   
d) Refrigerant flow from the outdoor unit shall be controlled by means of an inverter driven compressor.
   
e) The outdoor coil shall include 4 circuits with two position valves for each circuit, except for the last stage.
   
f. **Compressor:**
   
a) Each outdoor unit module shall be equipped with one inverter driven scroll hermetic compressor. Non-inverter-driven compressors, which cause inrush current (demand charges) and require larger wire sizing, shall not be allowed.
   
b) A crankcase heater(s) shall be factory mounted on the compressor(s).
   
c) The outdoor unit compressor shall have an inverter to modulate capacity. The capacity shall be completely variable with a turndown of 19%-5% of rated capacity, depending upon unit size.
   
d) The compressor will be equipped with an internal thermal overload.
   
e) The compressor shall be mounted to avoid the transmission of vibration.
   
f) Field-installed oil equalization lines between modules are not allowed. Prior to bidding, manufacturers requiring equalization must submit oil line sizing calculations specific to each system and module placement for this project.
   
g. **Controls:**
   
a) The outdoor unit shall have the capability of up to 8 levels of demand control for each refrigerant system.
   
h. **Electrical:**
   
a) The outdoor unit electrical power shall be 208/230 volts, 3-phase, 60 hertz.
   
b) The outdoor unit shall be capable of satisfactory operation within voltage limits of 187-228 volts (208V/60Hz), 207-253V (230V/60Hz).
   
c) The outdoor unit shall be controlled by integral microprocessors.
d) The control circuit between the indoor units, BC Controller and the outdoor unit shall be 24VDC completed using a 2-conductor, twisted pair shielded cable to provide total integration of the system.

(2) Branch CIRCUIT (BC) controllers FOR R2-SERIES SYSTEMS

a. General

The BC (Branch Circuit) Controllers shall include multiple branches to allow simultaneous heating and cooling by allowing either hot gas refrigerant to flow to indoor unit(s) for heating or subcooled liquid refrigerant to flow to indoor unit(s) for cooling. Refrigerant used for cooling must always be subcooled for optimal indoor unit LEV performance; alternate branch devices with no subcooling risk bubbles in liquid supplied to LEV and are not allowed.

The BC (Branch Circuit) Controllers shall be specifically used with R410A R2-Series systems. These units shall be equipped with a circuit board that interfaces to the M-NET controls system and shall perform all functions necessary for operation. The unit shall have a galvanized steel finish. The BC Controller shall be completely factory assembled, piped and wired. Each unit shall be run tested at the factory. This unit shall be mounted indoors, with access and service clearance provided for each controller. The sum of connected capacity of all indoor air handlers shall range from 50% to 150% of rated capacity.

b. BC Unit Cabinet:

a) The casing shall be fabricated of galvanized steel.

b) Each cabinet shall house a liquid-gas separator and multiple refrigeration control valves.

c) The unit shall house two tube-in-tube heat exchangers.

c. Refrigerant

a) R410A refrigerant shall be required.

d. Refrigerant valves:

a) The unit shall be furnished with multiple branch circuits which can individually accommodate up to 54,000 BTUH and up to three indoor units. Branches may be twinned to allow more than 54,000 BTUH.

b) Each branch shall have multiple two-position valves to control refrigerant flow.

c) Service shut-off valves shall be field-provided/installed for each branch to allow service to any indoor unit without field interruption to overall system operation.

d) Linear electronic expansion valves shall be used to control the variable refrigerant flow.
e. Future Use

a) Each VRF system shall include at least one (1) unused branches or branch devices for future use. Branches shall be fully installed & wired in central location with capped service shutoff valve & service port.

f. Integral Drain Pan:

a) 1. An Integral drain pan and drain shall be provided

g. Electrical:

a) The unit electrical power shall be 208/230 volts, 1 phase, 60 Hertz.

b) The unit shall be capable of satisfactory operation within voltage limits of 187-228 (208V/60Hz) or 207-253 (230/60Hz).

c) The BC Controller shall be controlled by integral microprocessors

d) The control circuit between the indoor units and outdoor units shall be 24VDC completed using a 2-conductor, twisted pair shielded cable to provide total integration of the system.

(3) PLFY-P**NCMU-ER4 (4-Way Ceiling-Recessed Cassette with Grille) Indoor Unit

a. General:

a) The PLFY-P**NCMU-ER4 shall be a four-way cassette style indoor unit that recesses into the ceiling with a ceiling grille. The indoor unit shall be factory assembled, wired and run tested. Contained within the unit shall be all factory wiring, piping, electronic modulating linear expansion device, control circuit board and fan motor. The unit shall have a self-diagnostic function, 3-minute time delay mechanism, an auto restart function, an emergency operation function and a test run switch. Indoor unit and refrigerant pipes shall be charged with dehydrated air before shipment from the factory.

b. Unit Cabinet:

a) The cabinet shall be a compact 22-7/16" wide x 22-7/16" deep so it will fit within a standard 24" square suspended ceiling grid.

b) The cabinet panel shall have provisions for a field installed filtered outside air intake.

c) Four-way grille shall be fixed to bottom of cabinet allowing two, three or four-way blow.

c. Fan:

a) The indoor fan shall be an assembly with a turbo fan direct driven by a single motor.
b) The indoor fan shall be statically and dynamically balanced to run on a motor with permanently lubricated bearings.

c) The indoor fan shall consist of three (3) speeds, Low, Mid, and High.

d) The indoor unit shall have an adjustable air outlet system offering 4-way airflow, 3-way airflow, or 2-way airflow.

e) The auto air swing vanes shall be capable of automatically swinging up and down for uniform air distribution.

d. Filter:

Return air shall be filtered by means of a long-life washable filter.

e. Coil:

a) The indoor coil shall be of nonferrous construction with smooth plate fins on copper tubing.

b) The tubing shall have inner grooves for high efficiency heat exchange.

c) All tube joints shall be brazed with phos-copper or silver alloy.

d) The coils shall be pressure tested at the factory.

e) A condensate pan and drain shall be provided under the coil.

f) The unit shall be provided with an integral condensate lift mechanism that will be able to raise drain water 19-3/4" inches above the condensate pan.

g) Both refrigerant lines to the PLFY indoor units shall be insulated in accordance with the installation manual.

f. Electrical:

a) The unit electrical power shall be 208/230 volts, 1-phase, 60 hertz.

b) The system shall be capable of satisfactory operation within voltage limits of 187-228 volts (208V/60Hz) or 207-253 volts (230V/60Hz).

g. Controls:

a) This unit shall use controls provided by Mitsubishi Electric to perform functions necessary to operate the system.

b) Indoor unit shall compensate for the higher temperature sensed by the return air sensor compared to the temperature at level of the occupant when in HEAT mode. Disabling of compensation shall be possible for individual units to accommodate instances when compensation is not required.
c) Control board shall include contacts for control of external heat source. External heat may be energized as second stage with 1.8°F – 9.0°F adjustable deadband from set point.

d) Indoor unit shall include no less than four (4) digital inputs capable of being used for customizable control strategies.

e) Indoor unit shall include no less than three (3) digital outputs capable of being used for customizable control strategies.

(4) PEFY-NMAU (CEILING-CONCEALED DUCTED) INDOOR UNIT

a. General:

The PEFY shall be a ceiling-concealed ducted indoor fan coil design that mounts above the ceiling with a 2-position, field adjustable return and a fixed horizontal discharge supply and shall have a modulating linear expansion device. The PEFY shall be used with the R2-Series outdoor unit and BC Controller, Y-Series outdoor unit, or S-Series outdoor unit. The PEFY shall support individual control using M-NET DDC controllers.

b. Indoor Unit.

The indoor unit shall be factory assembled, wired and run tested. Contained within the unit shall be all factory wiring, piping, electronic modulating linear expansion device, control circuit board and fan motor. The unit shall have a self-diagnostic function, 3-minute time delay mechanism, and an auto restart function. Indoor unit and refrigerant pipes shall be charged with dehydrated air before shipment from the factory.

c. Unit Cabinet:

a) The unit shall be, ceiling-concealed, ducted.

b) The cabinet panel shall have provisions for a field installed filtered outside air intake.

c) Fan:

   d) PEFY-NMAU models shall feature external static pressure settings from 0.14 to 0.60 in. WG.

   e) The indoor unit fan shall be an assembly with one or two Sirocco fan(s) direct driven by a single motor.

   f) The indoor fan shall be statically and dynamically balanced and run on a motor with permanently lubricated bearings.

   g) The indoor fan shall consist of three (3) speeds, High, Mid, and Low plus the Auto-Fan function

   h) The indoor unit shall have a ducted air outlet system and ducted return air system.
d. **Filter:**
   
   a) Return air shall be filtered by means of a standard factory installed return air filter.
   
   b) Optional return filter box (rear or bottom placement) with high-efficiency filter shall be available for all PEFY indoor units.

e. **Coil:**

   a) The indoor coil shall be of nonferrous construction with smooth plate fins on copper tubing.
   
   b) The tubing shall have inner grooves for high-efficiency heat exchange.
   
   c) All tube joints shall be brazed with phos-copper or silver alloy.
   
   d) The coils shall be pressure tested at the factory.
   
   e) A condensate pan and drain shall be provided under the coil.
   
   f) The condensate shall be gravity drained from the fan coil.
   
   g) Both refrigerant lines to the PEFY indoor units shall be insulated in accordance with the installation manual.

f. **Electrical:**

   a) The unit electrical power shall be 208/230 volts, 1-phase, 60 hertz.
   
   b) The system shall be capable of satisfactory operation within voltage limits of 187-228 volts (208V/60Hz) or 207-253 volts (230V/60Hz).

7. **Controls:**

   This unit shall use controls provided by Mitsubishi Electric Cooling & Heating to perform functions necessary to operate the system. Please refer to Part 5 of this guide specification for details on controllers and other control options.

   Indoor unit shall compensate for the higher temperature sensed by the return air sensor compared to the temperature at level of the occupant when in HEAT mode. Disabling of compensation shall be possible for individual units to accommodate instances when compensation is not required.

   Control board shall include contacts for control of external heat source. External heat may be energized as second stage with 1.8°F – 9.0°F adjustable deadband from set point.

   Indoor unit shall include no less than four (4) digital inputs capable of being used for customizable control strategies.

   Indoor unit shall include no less than three (3) digital outputs capable of being used for customizable control strategies.
(1) Network Controls

a. General:

The CITY MULTI Controls Network (CMCN) shall be capable of supporting remote controllers, centralized controllers, an integrated web based interface, graphical user workstation, and system integration to Building Management Systems via BACnet® and LonWorks®.

(2) Electrical Characteristics

The CMCN shall operate at 30VDC. Controller power and communications shall be via a common non-polar communications bus.

(3) Wiring:

a. Control wiring shall be installed in a daisy chain configuration from indoor unit to indoor unit, to the BC controller (main and subs, if applicable) and to the outdoor unit. Control wiring to remote controllers shall be run from the indoor unit terminal block to the controller associated with that unit.

b. Control wiring for the Smart ME remote controller shall be from the remote controller to the first associated indoor unit (TB-5) M-NET connection. The Smart ME remote controller shall be assigned an M-NET address.

c. Control wiring for the Simple MA and Wireless MA remote controllers shall be from the remote controller (receiver) to the first associated indoor unit (TB-15) then to the remaining associated indoor units (TB-15) in a daisy chain configuration.

d. Control wiring for centralized controllers shall be installed in a daisy chain configuration from outdoor unit to outdoor unit, to the system controllers (centralized controllers and/or integrated web based interface), to the power supply.

e. The AG-150 and EB-50GU centralized controller shall be capable of being networked with other AG-150 and EB-50GU centralized controllers for centralized control.

(4) Wiring type:

a. Wiring shall be 2-conductor (16 AWG), twisted, stranded, shielded wire as defined by the Diamond System Builder output.

b. Network wiring shall be CAT-5 with RJ-45 connection.

(5) CITY MULTI Controls Network

The CITY MULTI Controls Network (CMCN) consists of remote controllers, centralized controllers, and/or integrated web based interface communicating over a high-speed communication bus. The CITY MULTI Controls Network shall support operation monitoring, scheduling, occupancy, error email distribution, personal web browsers, tenant billing, online maintenance support,
and integration with Building Management Systems (BMS) using either LonWorks® or BACnet® interfaces. The below figure illustrates a sample CMCN System Configuration.

CMCN System Configuration

(6) CMCN: Remote Controllers

a. Smart ME Remote Controller (PAR-U01MEDU)

The Smart ME Remote Controller (PAR-U01MEDU) shall be capable of controlling up to 16 indoor units (defined as 1 group). The Smart ME Remote Controller shall be approximately 5.5" x 5" in size and white in color with an auto-timeout touch screen LCD display. The Smart ME Remote Controller shall support a selection from multiple languages (English, Spanish or French) for display information. The Smart ME supports temperature display selection of Fahrenheit or Celsius. The Smart ME Remote Controller shall control the following grouped operations: On/Off, Operation Mode (cool, heat, auto*, dry, fan and setback* (*R2/WR2-Series Simultaneous Heating and Cooling only)), temperature set point, fan speed setting, and airflow direction setting. The Smart ME Remote Controller shall support timer settings of on/off/temperature up to 8 times in a day in 5-minute increments. The Smart ME Remote Controller shall support an Auto Off timer. The Smart ME Remote Controller shall be able to limit the set temperature range from the Smart ME Remote Controller, or via a PC through a licensed EB-50GU. Also, the temperature range can be set from a touch screen panel on the TC-24. The room temperature shall be sensed at either the Smart ME Remote Controller or the Indoor Unit dependent on the indoor unit dipswitch setting. The Smart ME Remote Controller shall display a four-digit error code in the event of system abnormality or error.

The ME Remote Controller shall only be used in same group with other ME Remote Controllers with a maximum of two ME Remote Controllers per group.
The ME Remote Controller shall require manual addressing using rotary dial switch to the M-NET communication bus. The ME Remote Controller shall connect using two-wire, stranded, non-polar control wire to TB5 connection terminal on the indoor unit.

<table>
<thead>
<tr>
<th>Item</th>
<th>Description</th>
<th>Operation</th>
<th>Display</th>
</tr>
</thead>
<tbody>
<tr>
<td>ON/OFF</td>
<td>Run and stop operation for a single group</td>
<td>Each Group</td>
<td>Each Group</td>
</tr>
<tr>
<td>Backlight</td>
<td>Turns on when screen is touched. Timeout duration is adjustable.</td>
<td>Each Group</td>
<td>Each Group</td>
</tr>
<tr>
<td>Operation Mode</td>
<td>Switches between Cool/Dry/Auto/Fan/Heat/Setback.</td>
<td>Each Group</td>
<td>Each Group</td>
</tr>
<tr>
<td></td>
<td>Operation modes vary depending on the air conditioner unit. Auto and Setback mode are available for the R2/WR2-Series only.</td>
<td>Each Group</td>
<td>Each Group</td>
</tr>
<tr>
<td>Temperature Setting</td>
<td>Sets the temperature from 40°F – 95°F depending on operation mode and indoor unit.</td>
<td>Each Group</td>
<td>Each Group</td>
</tr>
<tr>
<td></td>
<td>Separate COOL and HEAT mode set points available depending on central controller and connected mechanical equipment.</td>
<td>Each Group</td>
<td>Each Group</td>
</tr>
<tr>
<td>Fan Speed Setting</td>
<td>Available fan speed settings depending on indoor unit.</td>
<td>Each Group</td>
<td>Each Group</td>
</tr>
<tr>
<td>Air Flow Direction Setting</td>
<td>Air flow direction settings vary depending on the indoor unit model.</td>
<td>Each Group</td>
<td>Each Group</td>
</tr>
<tr>
<td>Room Temp and Humidity Display</td>
<td>Displays the room temperature and humidity on the Home screen.</td>
<td>N/A</td>
<td>Each Group</td>
</tr>
<tr>
<td></td>
<td>Temperature and Humidity sensed can be calibrated using the sensor offset in 1 °F or 1% RH increments.</td>
<td>N/A</td>
<td>Each Group</td>
</tr>
<tr>
<td>Occupancy Sensor</td>
<td>Detects occupancy using an infrared motion sensor. Occupancy status is indicated on the remote controller and through the web interface depending on connected equipment. Sensitivity is adjustable.</td>
<td>N/A</td>
<td>Each Group</td>
</tr>
<tr>
<td>Brightness Sensor</td>
<td>Detects brightness in the space and indicates brightness on the remote controller and through the web browser interface depending on connected equipment. Sensitivity is adjustable.</td>
<td>N/A</td>
<td>Each Group</td>
</tr>
<tr>
<td>Item</td>
<td>Description</td>
<td>Operation</td>
<td>Display</td>
</tr>
<tr>
<td>-------------------------------</td>
<td>-----------------------------------------------------------------------------</td>
<td>-----------</td>
<td>---------</td>
</tr>
<tr>
<td>Status Monitor</td>
<td>Displays the status of general equipment control points connected to the Advanced HVAC Controller (DC-A21O)</td>
<td>N/A</td>
<td>Each Group</td>
</tr>
<tr>
<td>Humidity Setting</td>
<td>Sets the relative humidity set point in 1% increments for any humidifier connected to the Advanced HVAC Controller (DC-A21O)</td>
<td>Each Group</td>
<td>Each Group</td>
</tr>
<tr>
<td>LED Indicator</td>
<td>Can be set to indicate the operation status by lighting and flashing with different colors and brightness or by turning off to signal operation mode, stopped unit, error, occupancy, or home screen button pushes. Color can be set to indicate the current mode selected or room temp range being sensed. *Available colors include blue, light blue, yellow, white, green, red, and lime.</td>
<td>Each Group</td>
<td>Each Group</td>
</tr>
<tr>
<td>Schedule</td>
<td>Set up to 8 operations per day, 7 days per week. Operations include time on/off, mode and room temperature set point.</td>
<td>Each Group</td>
<td>Each Group</td>
</tr>
<tr>
<td>Permit / Prohibit Local Operation</td>
<td>Individually prohibit operation of each local remote control function (Start/Stop, Change operation mode, Set temperature, Fan Speed, Air Direction, Reset filter). *1: Operation icon lights up on the remote controller for prohibited functions.</td>
<td>N/A</td>
<td>Each Group *1</td>
</tr>
<tr>
<td>Item</td>
<td>Description</td>
<td>Operation</td>
<td>Display</td>
</tr>
<tr>
<td>---------------------------------</td>
<td>-----------------------------------------------------------------------------</td>
<td>-----------</td>
<td>---------</td>
</tr>
<tr>
<td>Energy-Save control during vacancy</td>
<td>When vacancy is detected by the occupancy sensor 5 control options are available for selection:</td>
<td>Each Group</td>
<td>Each Group</td>
</tr>
<tr>
<td></td>
<td>Stop/Setback Mode/Set Temperature Offset/Low Fan Speed/Thermostat-off</td>
<td>Each Group</td>
<td>Each Group</td>
</tr>
<tr>
<td></td>
<td>Brightness sensor can be used in conjunction with the occupancy sensor to increase accuracy.</td>
<td>Each Group</td>
<td>Each Group</td>
</tr>
<tr>
<td>Error</td>
<td>When an error is currently occurring on an air conditioner unit, the afflicted unit and the error code are displayed</td>
<td>N/A</td>
<td>Each Unit</td>
</tr>
<tr>
<td>Test Run</td>
<td>Operates air conditioner units in test run mode.</td>
<td>Each Group</td>
<td>Each Group</td>
</tr>
<tr>
<td>Ventilation Equipment</td>
<td>Up to 16 indoor units can be connected to an interlocked system that has one LOSSNAY unit. LOSSNAY items that can be set are “Hi”, “Low”, and “Stop”. Ventilation mode switching is not available.</td>
<td>Each Group</td>
<td>Each Group</td>
</tr>
<tr>
<td>Set Temperature Range Limit</td>
<td>Set temperature range limit for auto, cool (drying) and heat modes.</td>
<td>Each Group</td>
<td>Each Group</td>
</tr>
<tr>
<td>Operation Lock Out Function</td>
<td>Locking of ON/OFF, Mode, Set Temp, Hold button and Air Direction.</td>
<td>Each Group</td>
<td>Each Group</td>
</tr>
<tr>
<td>Password</td>
<td>User and Service password protections are available</td>
<td>Each Group</td>
<td>N/A</td>
</tr>
<tr>
<td>Hold</td>
<td>Hold Prohibits the scheduled operation from being executed</td>
<td>Each Group</td>
<td>Each Group</td>
</tr>
<tr>
<td></td>
<td>a. ON/OFF timer</td>
<td>Each Group</td>
<td>Each Group</td>
</tr>
<tr>
<td></td>
<td>b. Auto-OFF timer</td>
<td>Each Group</td>
<td>Each Group</td>
</tr>
<tr>
<td></td>
<td>c. Weekly timer</td>
<td>Each Group</td>
<td>Each Group</td>
</tr>
<tr>
<td></td>
<td>d. Automatic return to the preset temperature</td>
<td>Each Group</td>
<td>Each Group</td>
</tr>
<tr>
<td></td>
<td>* While an operation is prohibited by Hold function, the operation icon lights up.</td>
<td>Each Group</td>
<td>Each Group</td>
</tr>
</tbody>
</table>

(1) Centralized Controller (Web-enabled)
a. AG-150 Centralized Controller

The AG-150 Centralized Controller shall be capable of controlling a maximum of 50 indoor units across multiple CITY MULTI outdoor units. The AG-150 Centralized Controller shall be approximately 7-1/2”x12” in size and shall be powered from a Power Supply Unit (PAC-SC51KUA). The AG-150 Centralized Controller shall support system configuration, daily/weekly scheduling, monitoring of operation status, night setback settings, free contact interlock configuration and malfunction monitoring. The AG-150 Centralized Controller shall have five basic operation controls which can be applied to an individual indoor unit, a group of indoor units (up to 50 indoor units), or all indoor units (collective batch operation). This basic set of operation controls for the AG-150 Centralized Controller shall include on/off, operation mode selection (cool, heat, auto (R2/WR2-Series only), dry, and fan), temperature setting, fan speed setting, and airflow direction setting. Since the AG-150 provides centralized control it shall be able to enable or disable operation of local remote controllers. In terms of scheduling, the AG-150 Centralized Controller shall allow the user to define both daily and weekly schedules with operations consisting of ON/OFF, mode selection, temperature setting, air flow (vane) direction, fan speed, and permit/prohibit of remote controllers.

<table>
<thead>
<tr>
<th>AG-150 (Centralized Controller) Item</th>
<th>Operation Display</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>ON/OFF</td>
<td>Each Block, Group or Collective</td>
<td>Run and stop operation.</td>
</tr>
<tr>
<td>Operation Mode</td>
<td>Each Group</td>
<td>Switches between Cool/Dry/Auto/Fan/Heat.</td>
</tr>
<tr>
<td></td>
<td>Each Block, Group or Collective</td>
<td>(Group of Lossnan unit: automatic ventilation/vent-heat/interchange/normal ventilation)</td>
</tr>
<tr>
<td></td>
<td>Each Group</td>
<td>Operation modes vary depending on the air conditioner unit.</td>
</tr>
<tr>
<td></td>
<td>Each Group</td>
<td>Auto mode is available for the R2/WR2-Series only.</td>
</tr>
<tr>
<td>Temperature Setting</td>
<td>Each Block, Group or Collective</td>
<td>Sets the temperature from 57°F – 87°F depending on operation mode and indoor unit.</td>
</tr>
<tr>
<td>Item</td>
<td>Description</td>
<td>Operation</td>
</tr>
<tr>
<td>-------------------------------</td>
<td>-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------</td>
<td>------------------</td>
</tr>
<tr>
<td><strong>Set Temperature Range Limit</strong></td>
<td>The range of room temperature setting can be limited by the initial setting. The lowest limit temperature can be made higher than the usual (67°F) in cool/dry mode, while the upper limit temperature lower than the usual (83°F) in heat mode.</td>
<td>Each Group</td>
</tr>
<tr>
<td><strong>Fan Speed Setting</strong></td>
<td>Available fan speed settings depending on indoor unit.</td>
<td>Each Block, Group or Collective</td>
</tr>
<tr>
<td><strong>Air Flow Direction Setting</strong></td>
<td>Air flow direction settings vary depending on the indoor unit model.</td>
<td>*1 Each Block, Group or Collective</td>
</tr>
<tr>
<td></td>
<td>*1. Louver cannot be set.</td>
<td></td>
</tr>
<tr>
<td><strong>Schedule Operation</strong></td>
<td>Annual/weekly/today schedule can be set for each group of air conditioning units. Optimized start setting is also available.</td>
<td>*2 Each Block, Group or Collective</td>
</tr>
<tr>
<td></td>
<td>*1. The system follows either the current day, annual schedule, or weekly, which are in the descending order of overriding priority. Twenty-four events can scheduled per day, including ON/OFF, Mode, Temperature Setting, Air Direction, Fan Speed and Operation Prohibition. Five types of weekly schedule (seasonal) can be set. Settable items depend on the functions that a given air conditioning unit supports.</td>
<td></td>
</tr>
<tr>
<td><strong>Optimized Start</strong></td>
<td>Unit starts 5 - 60 minutes before the scheduled time based on the operation data history in order to reach the scheduled temperature at the scheduled time.</td>
<td>Each Block, Group or Collective</td>
</tr>
<tr>
<td><strong>Night Setback Setting</strong></td>
<td>The function helps keep the indoor temperature in the temperature range while the units are stopped and during the time this function is effective.</td>
<td>Each Group</td>
</tr>
<tr>
<td>Item</td>
<td>Description</td>
<td>Operation</td>
</tr>
<tr>
<td>-------------------------------</td>
<td>-------------------------------------------------------------------------------------------------------</td>
<td>--------------------</td>
</tr>
<tr>
<td>Permit / Prohibit Local Operation</td>
<td>Individually prohibit operation of each local remote control function (Start/Stop, Change operation mode, Set temperature, Reset filter).</td>
<td>Each Block, Group or Collective</td>
</tr>
<tr>
<td>Room Temp</td>
<td>Displays the room temperature of the group.</td>
<td>N/A</td>
</tr>
<tr>
<td>Error</td>
<td>When an error is currently occurring on an air conditioner unit, the afflicted unit and the error code are displayed</td>
<td>N/A</td>
</tr>
<tr>
<td>Ventilation Equipment</td>
<td>This interlocked system settings can be performed by the master system controller.</td>
<td>Each Group</td>
</tr>
<tr>
<td></td>
<td>When setting the interlocked system, use the ventilation switch the free plan LOSSNAY settings between “Hi”, “Low” and “Stop”.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>When setting a group of only free plan LOSSNAY units, you can switch between “Normal ventilation”, “Interchange ventilation” and “Automatic ventilation”.</td>
<td></td>
</tr>
<tr>
<td>Multiple Language</td>
<td>Other than English, the following language can be chosen. Spanish, French, Japanese, Dutch, Italian, Russian, Chinese, and Portuguese are available.</td>
<td>N/A</td>
</tr>
</tbody>
</table>
## AG-150 (Centralized Controller)

<table>
<thead>
<tr>
<th>Item</th>
<th>Description</th>
<th>Operation</th>
<th>Display</th>
</tr>
</thead>
<tbody>
<tr>
<td>External Input / Output</td>
<td>By using accessory cables you can set and monitor the following. &lt;br&gt;Input &lt;br&gt;By level: “Batch start/stop”, “Batch emergency stop” &lt;br&gt;By pulse: “batch start/stop”, “Enable/disable remote controller” &lt;br&gt;Output: “start/stop”, “error/Normal”</td>
<td>*5 Collective</td>
<td>*5 Collective</td>
</tr>
</tbody>
</table>

*5 Requires the external I/O cables (PAC-YG10HA-E) sold separately.

| Free Contact Interlock Control | Operation of indoor groups, general equipment or free contact outputs based on group(s) conditions or free contact(s) input states. | Each Group, Output or Collective | N/A |

All AG-150 Centralized Controllers shall be equipped with one RJ-45 Ethernet port to support interconnection with a network PC via a closed/direct Local Area Network (LAN).

The AG-150 Centralized Controller shall be capable of performing initial settings via the 9” high-resolution, backlit, color touch panel on the controller or via a PC using the AG-150 Centralized Controller’s initial setting browser.

Standard software functions shall be available so that the building manager can securely log into each AG-150 via the PC’s web browser to support operation monitoring, scheduling, error email, interlocking and online maintenance diagnostics. Additional optional software functions of personal browser for PCs and MACs and Tenant Billing shall be available. The Tenant Billing function shall require TG-2000 Integrated System software in conjunction with AG-150 Centralized Controllers.

8. Execution

(2) Installation

a. General:

Rig and install in full accordance with manufacturer’s requirements, project drawings, and contract documents. Refer to the manufacturer’s installation manual for full requirements.
(3) Location:

Locate indoor and outdoor units as indicated on drawings. Provide service clearance per manufacturer’s installation manual. Adjust and level outdoor units on support structure.

For climates that experience snowfall, mount the outdoor unit a minimum of 12” above the average snowfall line. In climates where this height requirement proves unfeasible, the outdoor units may be installed at the average snowfall line provided regular snow removal in the area surrounding the units keeps the snow line below the bottom of the units.

(4) Components / Piping:

a. Installing contractor shall provide and install all accessories and piping for a fully operational system. Refer to manufacturer’s installation manual for full instructions.

Traps, filter driers, and sight glasses are NOT to be installed on the refrigerant piping or condensate lines.

Standard ACR fittings rated for use with R410A are to be used for all connections. Proprietary manufacturer-specific appurtenances are not allowed.

Refrigerant pipe for CITY MULTI shall be made of phosphorus deoxidized copper, and has two types.

a) ACR “Annealed”: Soft copper pipe, can be easily bent with human’s hand.

b) ACR “Drawn Temper”: Hard copper pipe (Straight pipe), being stronger than Type-O pipe of the same radical thickness.

b. The maximum operation pressure of R410A air conditioner is 4.30 MPa [623psi]. The refrigerant piping should ensure the safety under the maximum operation pressure. Refer to recommend piping specifications in Mitsubishi Electric’s engineering manual. Pipes of radical thickness 0.7mm or less shall not be used.

Flare connection should follow dimensions provided in manufacturer’s installation manuals.

c. Insulation:

Refrigerant lines, as well as any valves, shall be insulated end to end with ½” closed-cell pipe insulation for piping up to 1” in diameter, or ¾” for piping 1-1/8” and larger, with a thermal conductivity no greater than 0.27 BTU-in/hr sq.ft oF. If state or local codes require insulation other than that specified above, the greater insulation shall be used.

d. Electrical:

Installing contractor shall coordinate electrical requirements and
connections for all power feeds with electrical contractor. Refer to Division 26 (Master Format 2004) or Division Section 16 (Master Format 1995) for additional information.

e. Third Party Controls:

Installing contractor shall coordinate all BAS/BMS control requirements and connections with controls contractor.

E. Radiant Unit Heaters

1. General

   (1) Unit shall be supplied to meet this specification without substitution except by engineer's approval. Manufacturer to be Reznor or equal.

   (2) Provide (82%, 83%) high-efficiency, power vented, gas-fired unit heaters, designed for use in building areas where environmental factors require the use of separated combustion when high reliability is required and venting is either vertical or horizontal.

   All units shall be design certified by the Canadian Standards Association to ANZI ZA83.8b and CSA 2.6b for commercial/industrial installation.

   All units provided will be manufactured in an ISO 9002 certified facility.

   Unit shall be certified to CSA International Requirement 10-96 U.S. for RESIDENTIAL GARAGE INSTALLATION.

2. Cabinet Construction

   (1) The cabinet shall be low profile with a pre-coat or powdercoat RAL 9010 white paint finish. Finish shall be a minimum 80 gloss on G30 galvanized steel.

   (2) The cabinet shall be constructed so that screws are not visible from the bottom, front, or sides, except for service panel and accessories.

   (3) All units shall be manufactured with a tooled drawn supply air orifice on the rear panel to reduce fan inlet noise.

   (4) The unit shall be designed for ceiling suspension featuring 3/8” threaded hanger rods and a 4-point suspension kit.

   (5) The cabinet shall be equipped with a full safety fan guard with no more than 1 inch grill spacing. The motor and fan assembly shall be resiliently mounted to the cabinet to reduce vibration and noise.

   (6) The unit shall be designed with a full opening service panel complete with screw closure attachment and lifting handle for removal. All components in the gas train, all standard electrical controls, and the power venter shall be within the service compartment. Minimum top clearance from combustibles shall be 1”. Minimum bottom clearance from combustibles shall be 1” for all Sizes. Minimum clearance from combustibles on non-service side shall be 1”.
(7) Unit to be supplied with soft, conforming gasket material around access door to prevent cabinet leakage.

(8) All seams and openings in cabinet burner & controls area to be sealed to minimize space air filtration.

(9) Unit to be supplied with combustion air inlet roll crimped to the unit for solid gap-free joint.

3. Combustion Air and Venting

(1) The units shall be designed as Separated Combustion Units. The unit shall have a factory-installed power venter device to draw outdoor combustion air via a combustion air inlet pipe through an inlet collar on the cabinet.

(2) The combustion air/venting system shall include a vibration isolated power venter motor and wheel assembly and a combustion air pressure switch.

4. Electrical Specifications & Control Systems

(1) Ignition to be controlled with direct spark multi-try ignition with electronic flame supervision with 100% lockout integrity controlled via a printed circuit board.

(2) Said unit control board shall incorporate diagnostic lights, DIP switches for fan overrun settings, and a relay for fan only operation.

(3) All units shall be equipped with a safety limit switch.

(4) All controls shall be enclosed in the unit housing to protect them from accidental damage that could be caused by factors in the building that would adversely affect external mounted controls.

(5) Supply voltage connections are made at the circuit board.

(6) 24-volt control connections shall be made on an externally mounted terminal strip with connections (W1, W2, R, and G).

(7) All internal wiring, both line and control voltages, shall be terminated by insulated terminal connectors to minimize shock hazard during service.

(8) Access Door shall feature an integral door open interlock switch to de-energize unit while open for service.

(9) Manufacturer to include supply voltage junction enclosure inside unit for improved separation of combustion air from room space air and contaminants.

(10) Unit shall be configured for 115 Volt, Single Phase, 60 cycle supply voltage.

5. Fuel & Burner Type

(1) Unit to be supplied for operation with natural gas as fuel source.
(2) Burner shall be of a single body design with stainless steel face insert. Said burner shall require on orifice supplying multiple heat exchanger tubes.

(3) The unit shall incorporate a single, one piece burner assembly with a single orifice per staging. The burner shall have a continuous wound close, pressed stainless steel ribbon separating the flame from the burner interior.

(4) All units shall have a single, venturi tube and orifice supplying fuel to a one-piece burner housing per staging.

(5) Each heat exchanger cell shall use balanced draft induction to maintain optimum flame control.

6. Gas Train, Controls & Ignition

(1) Gas controls for said furnace shall be designed for recirculating air heating application. Furnace shall be provided with a 24 volt, single-stage combination gas valve which includes the electronic on-off valve controlled by a single-stage 24-volt room thermostat, a pressure regulator, a safety pilot valve, and the manual shutoff valve.

7. Heat Exchanger

(1) The heater shall be equipped with a multicell, 4pass serpentine style steel heat exchanger. Heat exchanger tubes shall be press-fabricated.

(2) All heat exchangers shall be fabricated with no welding or brazing, only tool pressed mechanical joints. All heat exchanger cells shall be designed with an aerodynamic cross section to provide maximum airflow.

(3) Manufacturer's Limited Warranty for heat exchangers applies. Refer to written limited warranty for terms.

8. Installation & Mounting

(1) Code Requirements

The unit shall be installed in accordance with the standards of the National Fire Protection Association or the National Fuel Gas Code for gas-fired duct furnaces, and these standards should be followed carefully. Authorities having jurisdiction should be consulted before installations are made to verify local codes and installation procedures.

The unit shall be installed in accordance with the National Fuel Gas Code ANSI Z223.1.

In Canada, the installation of these appliances is to be in accordance with CAN/C.G.A-B149.1 and B149.2, Installation Code for Gas Burning Appliances and Equipment, and local codes.

(2) Electrical Supply and Connections

All electrical wiring and connections including electrical grounding should be
made in accordance with the National Electric Code ANSI/NFPA No. 70, or in Canada, the Canadian Electrical Code, Part I-CSA. Standard C22.1. Check any local ordinance or power company requirements that apply. A separate line voltage supply should be run directly from the main panel to a fused disconnect switch, at the unit, and then making connection to leads in the unit junction box. All external wiring must be made within approved conduit and have a minimum temperature rise rating of 60 degrees C. The unit must be electrically grounded in accordance with the National Electrical Code, ANSI/NFPA No. 70 or CSA Standard C22.1 when installed, if an external electrical source is utilized.

(3) Gas Piping & Pressure

All piping must be in accordance with requirements outlined in the National Fuel Gas Code ANSI Z223.1 or CAN/C.G.A. –B149 (.1 or .2). Where regulations require an ease of servicing, install a ground joint union and manual shutoff valve upstream of unit control system.

9. Miscellaneous Features

(1) Manufacturer shall provide, for field installation by contractor, a 60° Downturn air nozzle with 50°-90°variable air deflection range from louvers.

2.05 AIR DISTRIBUTION:

A. Performance: Shall provide the required air throw and spread with no apparent drafts or excessive air movement within the air conditioned area. Any air distribution accessories required to effect these conditions shall be provided and installed by the Contractor. Grilles, registers or ceiling diffusers causing excessive air movement, drafts or objectionable noise, shall be replaced at no cost to the Owner. Paint inside of all ducts including volume dampers, etc., behind registers and diffusers with two coats flat black enamel.

B. Locations: All devices shall be installed in approximately the location indicated on the drawings but the Contractor shall verify the exact locations at the building, and with the drawings, making any minor changes as may be required and as approved by the Owner.

C. Air Distribution shall be “Titus” Manufacture of the model numbers listed, Metal Aire or Krueger.

<table>
<thead>
<tr>
<th>LAY-IN TYPE CEILING</th>
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</tr>
</thead>
<tbody>
<tr>
<td>Ceiling Diffusers:</td>
<td>Model PCS3FW, Perforated 24 x 24 panel, Type 3 Border</td>
<td></td>
</tr>
<tr>
<td>Return Registers:</td>
<td>Model PAR3FW, Perforated 24 x 24 panel, Type 1 Border</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>PLASTER CEILING</th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Ceiling Diffusers:</td>
<td>Model PCS3FW, Perforated, Flush Face, Surface Mount</td>
<td></td>
</tr>
<tr>
<td>Return Registers:</td>
<td>Model PAR3FW, Perforated, Flush Face, Surface</td>
<td></td>
</tr>
</tbody>
</table>
### SIDEWALL REGISTERS

<table>
<thead>
<tr>
<th>Mount</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Supply:</strong></td>
<td>Model 300, O.B.D., Double Deflection, Sponge Rubber Gasket</td>
</tr>
<tr>
<td><strong>Return:</strong></td>
<td>Model 350, O.B.D., Sponge Rubber Gasket</td>
</tr>
<tr>
<td><strong>Return Grilles with Filter Frame:</strong></td>
<td>Model 350 RF1, W/1” Filter Frame, Hinged Face and (Quarter Turn Fasteners) (Knurled Knob Fasteners).</td>
</tr>
</tbody>
</table>

#### 2.06 GAS VENT:

A. The gas vent system shall be so engineered and constructed as to develop a positive flow adequate to exhaust all flue gasses to outside atmosphere, without condensation with the vent or spillage at any appliance draft hood.

B. All parts of vent system shall be of Underwriters’ Laboratories Inc., listed MetalbestoS type B double wall gas vent piping, and such piping shall be continuous from the appliance outlets into Metalbestos vent top.

C. The Metalbestos gas vent piping shall be installed in full compliance with the terms of its listing, with the manufacturer’s installation instructions, and with building codes representing good practice for such installations.

#### 2.07 AUTOMATIC TEMPERATURE CONTROL:

A. Summary: The temperature control manufacturer as described under this heading shall furnish and install a complete system of automatic controls as shown on plans and as specified hereinafter. All control equipment shall be the product of one manufacturer and shall be basically of the electric type. Control equipment shall be Honeywell, Inc. The control manufacturer shall have a representative sample of local jobs to validate performance and shall have maintained a full-time local service organization for at least three years.

B. Drawings and Checkout: The Temperature Control Contractor shall submit shop drawings of the entire control system to the Architect for approval before starting work. The control system shall be completely checked out, adjusted and calibrated to perform all required functions for proper operation.

C. Electrical Wiring: See paragraph 3.7 of this section.

D. Smoke Detectors:

1. The air duct smoke detector shall be of the photoelectronic type.

2. The detector housing shall be California State Fire Marshall listed (CASFM) and UL listed per UL268A, specifically for use in air handling systems.

3. The detector shall operate at air velocities of 100’ per minute to 4,000’ per minute.

4. The detector shall be capable of local reset button or remote test switch (RTS).

5. The duct detector housing shall incorporate an airtight smoke chamber in compliance with UL268A, Standard for Smoke Detectors for Duct Applications.
6. The housing shall be capable of mounting to either rectangular or round ducts without adaptor brackets.

7. An integral filter system shall be included to reduce dust and residue effects on the detector and housing, thereby, reducing maintenance and servicing.

8. Sampling tubes shall be either be plastic or be able to be installed after the housing is mounted to the duct by passing through the duct housing.

9. The enclosure shall meet all applicable NEC and NFPA standards regarding the electrical junction boxes. Terminal connections shall be a strip and clamp method that is suitable for 12-18 AWG wiring.

2.08 MOTORS, DRIVES, GUARDS AND STARTERS:

A. Motors shall be built to the specifications of the National Electric Manufacturer’s Association (NEMA). The motor shall be ball bearing, drip-proof, squirrel cage induction type for full voltage start, to operate at speeds not to exceed 1750 rpm except when indicated otherwise. The motors shall be Lincoln, Electro Dynamic, Sterling, or approved equivalent. Motors mounted outdoors shall have encapsulated windings and have weatherproof hood. The minimum service factor shall be 1.15.

B. Drives shall have one belt for units under 5 horsepower, at least 2 belts for units 5 horsepower to 25 horsepower, and 3 belts for units 25 horsepower and over. Belts shall be V-belt design sized for at least 150 percent of the motor horsepower. Motor pulleys shall be of the variable pitch up to 7-1/2 horsepower and fixed pitch type, 10 horsepower and larger. Pulleys shall be cast-iron with steel bushings. Provide additional new pulleys where required to drive fans at speeds necessary to give the indicated volumes. Belts shall be Bates, B.F. Goodrich, Goodyear or equal.

C. V-belt drives for the fans shall be properly protected by metal guards. Guards shall be made of not less than 16 gauge expanded metal %-inch mesh, on an angle iron frame so as to securely close in the top, bottom and both sides of the drive. Ample allowance shall be made in guard for motor and belt adjustment. The guard shall be provided with openings so that the rpm of the fans may be obtained. Guards on equipment outside of building shall be of weatherproof design.

D. All guards shall be given a prime coat and one heavy coat of machinery gray enamel.

E. All guards shall conform to California General Industrial Safety Order Requirements

F. Starters shall be across-the-line type or part winding type as required, with overload protection on all legs and shall be manual or magnetic where shown on the drawings. Starters shall be complete with NEMA Type I, enclosures with built-in “Hand-Off-Automatic” switch. Magnetic starters exposed to weather shall have NEMA Type 4 enclosure.

2.09 MOTORIZED CONTROL DAMPERS

A. Manufacturers:

1. Nailor Industries Inc.
2. Young Regulator Company
3. Approved Equal
B. General Description: AMCA-rated, parallel-blade design; minimum of 0.1084-inch- thick, galvanized-steel frames with holes for duct mounting; minimum of 0.0635-inch- thick, galvanized-steel damper blades with maximum blade width of 8 inches.

1. Secure blades to 1/2-inch- diameter, zinc-plated axles using zinc-plated hardware, with nylon blade bearings, blade-linkage hardware of zinc-plated steel and brass, ends sealed against spring-stainless-steel blade bearings, and thrust bearings at each end of every blade.
2. Operating Temperature Range: From minus 40 to plus 200 deg F.
3. Provide paralle-blade design with replaceable rubber seals, rated for leakage at less than 10 cfm per sq. ft. of damper area, at differential pressure of 4-inch wg when damper is being held by torque of 50 in. x lbf; when tested according to AMCA 500D.

PART 3 - EXECUTION

3.01 DUCTWORK:

A. Ductwork fabrication and installation shall conform to the recommendation of the latest edition of the duct construction standards as published by the Sheet Metal and Air Conditioning Contractors National Association, Inc., (SMACNA). These standards shall govern type of seams and joints, reinforcing and supports, corner closures duct hangers, elbows, turning vanes (use double vane type), tapers offsets; streamliners, branches from mains, tee connections, volume dampers, access doors in ducts, fire damper installation, casings and housing. All unwrapped exposed ducts shall be cross-broken; beading will not be acceptable. Ducts that are wrapped shall be cross-broken or beaded.

B. Volume dampers shall be caulked in the ducts to avoid bypass. Damper blade position on all dampers shall be indicated by filing a notch in the exposed operation rod or splitter damper rod. Volume control dampers shall be installed in all branch ducts, whether shown on drawings or not, to allow balancing of the system. Where damper frames and blades constitute an obstruction in excess of 15 percent of the duct area, the duct shall be increased in size to receive the damper.

C. All supply, return, and exhaust duct joints shall be sealed airtight with approved mastic.

D. All duct seams and joints exposed to weather shall be caulked watertight with acrylic sealant and shall have 4-inch minimum width of 6-ounce canvas pasted on with lagging adhesive.

3.02 PIPING INSTALLATION:

A. Refrigerant Piping: Cut pipe accurately to measure established at the site and work into place without springing or forcing. Install piping with sufficient flexibility for expansion and contraction due to temperature fluctuation inherent in its operation. Where pipe passes through building structure, pipe joints shall not be concealed, but located where they may be readily inspected. Run all piping essentially as indicated and detailed on the plans, taking care to avoid interference with other piping, conduit or equipment. Run piping plumb and straight and parallel sleeves of suitable size for all lines passing through building structure. Braze refrigerant piping with silver solder complying with AWS A5.8. The inside of tubing and fittings shall be free of flux. Clean the parts to be joined with emery cloth and keep hot until the solder has penetrated the full depth of the fitting and the extra flux has been expelled. Cool joints in air and remove flame marks and traces of
flux. During the brazing operation, prevent an oxide film from forming on the inside of the tubing by slowly flowing dry nitrogen to expel the air. Make provision to automatically return oil on halocarbon systems.

B. Pipe Sleeves: Provide pipe sleeves for all pipes and tubing which penetrate the building structure. Sleeves shall be securely retained in position and location before and during construction. Space between pipe and sleeves, shall be not less than V4” between outside of pipe and inside wall of sleeves. Pack the annular spaced with hemp or fiberglass, and seal with elastic cement. Sleeves for uninsulated pipes shall have ends flush with finished wall surfaces and the pipe or tubing shall be provided as above, with outside perimeter of pipe caulked to the sleeve. Extend sleeves for lines passing through floors 3” above finished floor slab, and caulk to the slab. Provide lines passing through roof areas with necessary slashing and counterflashing to provide a water-tight roof seal.

C. Leak testing upon completion of installation of the air conditioning equipment, test all factory as well as field refrigerant piping with an electronic-type leak detector to acquire a leak-tight refrigerant system. If leaks are detected at the time of installation or during the guarantee period, remove the entire refrigerant charge from the system, correct the leaks and retest the system.

D. Evacuation, Dehydration, and Charging: After system is found to be without leaks, evacuate the system using an electronic gage with range accurate to 10 microns and a vacuum pump capable of pulling a vacuum of at least 1 mm Hg absolute. Evacuate system in strict accordance with the triple-evacuation and blotter method or in strict accordance with equipment manufacturer’s printed instructions. System leak testing, evacuation, dehydration, and charging with refrigerant shall comply with ARI 260.

3.03 INSULATION INSTALLATION:

A. Insulate no piping or equipment until tested and approved for tightness. All piping shall be dry when insulated.

B. Ductwork Insulation:

1. Supply Air Ductwork Above Ceiling: Secure insulation to duct with mechanical fasteners on 18” centers or on underside of rectangular ducts over 30” wide. Seal all joints, fastener penetrations and other breaks in vapor barrier with 3” wide strips of the same facing material adhered with vapor barrier adhesive, Manville Z-Glue or approved equal, or 3” wide strips of white glass fabric, Manville Duramesh Fabric No. 206 or approved equal, coated with vapor barrier mastic, Foster 30-35 or approved equal.

2. Return Air Ductwork Above Ceiling: The insulation shall be wrapped entirely around the duct with all joints lapped at least 2” and secured with 16 gauge galvanized wire on 12” centers. The insulation shall cover all surfaces including standing seams.

3. Ductwork Liner: The duct liner shall be applied with 100% coverage of approved fire resistant adhesive. On ducts over 20” wide or deep, the liner shall be additionally secured with mechanical fasteners on maximum 15” centers. Fasteners shall start within 2” of the leading edge of each section and within the duct section. All exposed edges and the leading edge of all cross joints of the liner shall be heavily coated with an approved fire resistant adhesive. The duct liner shall be cut to assure snug closing corner joints, the black surface of the liner shall face the air stream, transverse joints shall be neatly butted, and all damaged areas shall be
heavily coated with an approved adhesive.

3.04 EQUIPMENT INSTALLATION:

A. The installation of all air conditioning equipment and exhaust fans shall be strictly in accordance with the manufacturer’s instruction and installation book. All recommendations of manufacturer shall be followed, required clearances maintained, and factory approval secured for each installation. All equipment shall be securely fastened to its base. All parts of the installation shall be made weatherproof. A copy of the manufacturer’s installation and service manual shall be kept with each piece of equipment at all times to allow an inspector to determine if the installation meets requirements.

B. All work shall be performed by skilled mechanics, under the supervision of a competent foreman and in accordance with the best standards of practice of the trade.

3.05 ROOF AND WALL PENETRATIONS:

A. All penetrations of roof and exterior walls shall be flashed watertight with lead or galvanized iron.

B. Flashing shall comply with requirements for flashing in Sheet Metal Section.

C. Pipe flashing shall be counterflashing sleeve type with 4 pound seamless lead flashing with 8” skirt. The joint shall be sealed with Permaseal water-proofing compound or equal.

3.06 IDENTIFICATION OF MECHANICAL EQUIPMENT:

A. Equipment: Equipment shall be identified by stenciling the identification plainly (such as EF-1 as shown on equipment schedule) on the service side. Lettering to be minimum size of 1”. This applies to fans, boiler, etc.

3.07 ELECTRICAL WORK:

A. Power voltage wiring and connections thereto and all power voltage conduit shall be furnished and installed under the Electrical Division of the specifications.

B. Low voltage and line voltage control wiring and connections thereto and all low and line voltage control conduit shall be furnished and installed under the Mechanical Sections of the specifications.

C. Relays, push button stations, control equipment, etc., shall be furnished under the Mechanical Section of the specifications, except as noted on the drawings. Check drawings closely for starters that will be furnished under the Electrical Division which will be in Motor Control Panels. Magnetic motor starters, except those furnished with packaged mechanical equipment, will be furnished under Mechanical Division.

D. Disconnect switches shall be furnished, installed and connected under the Electrical Division of the specification.

3.08 EARTHQUAKE RESTRAINT:

A. Provide a means to prohibit excessive motion of all mechanical equipment during an earthquake.
B. All mechanical equipment, both hanging and base mounted, shall be provided with mounting connection points of sufficient strength to resist lateral seismic forces equal to 0.5 of equipment operating weight.

3.09 SHOP PRIMING PROCEDURES:

A. Ferrous metal items, except items to be encased in concrete and areas adjacent to field welds shall be thoroughly cleaned and prime painted.

B. Surfaces shall be cleaned free of loose mill scale, loose rust, accessible weld slag or flux deposit, dirt and other foreign matter by hand wire brushing. Oil and grease deposits shall be removed by solvent.

C. After cleaning, surfaces shall be given one shop coat of prime paint applied thoroughly and evenly to dry surfaces. Surfaces inaccessible after assembly or erection shall be given an additional shop coat of slightly different color than first coat.

D. After erection, rough up with prime paint all members where shop coat has been damaged, welds and area adjacent to welds and field bolts.

3.10 TEST AND BALANCE:

A. The Contractor shall furnish all labor, equipment and services necessary for and incidental to air and water systems testing and balancing.

B. Include an extended warranty of one year after final acceptance by Owner, during which time the Owner may request a recheck or resetting of any outlet, coil or device listed in the test report. Provide technicians to assist in making any test or adjustment required.

C. Contractor shall at his own expense, procure the service of an independent air balance and testing agency approved by the Owner, which specializes in the balancing and testing of heating, air conditioning and ventilating systems, to balance, adjust and test all air moving equipment, air distribution systems and exhausting systems as herein specified. All instruments used by this agency shall be accurately calibrated and maintained in good working order. If requested, the test shall be conducted in the presence of the Owner and/or his representative.

D. Air balance and testing shall not begin until system has been completed and is in full working order. The Contractor shall put all heating, ventilating and air conditioning systems and equipment in full operation and shall continue the operation of same during each working day of testing and balancing. The Contractor shall submit, within fifteen (15) days after receipt of Contract, one copy of submittal data for the testing and balancing of the air conditioning, heating and ventilating systems. The air balance agency shall provide proof of having successfully completed at least five projects of similar size and scope and shall be a certified member of the Associated Air Balance Council and/or National Environmental Balancing Bureau and/or Testing Adjusting & Balancing Bureau (TABB) unless otherwise approved.

E. Test and balance agency shall include an extended warranty of ninety (90) days after completion of test and balancing work, during which time the Owner, at his discretion, may request a recheck or resetting of any outlet, supply air fan, or exhaust fan as listed in test report. The agency shall provide technicians to assist the Engineer in making any test he may require during this period of time. Commissioning agent shall conduct “spot checks” on air distribution to verify air balancing.
F. The Air Conditioning Contractor shall award the test and balance Contract to the approved agency upon receipt of his Contract to proceed with air conditioning installation, to allow the air balance agency to schedule this work in cooperation with other trades involved and comply with the completion date.

G. Upon completion of the air conditioning system, the air balance agency shall perform the tests, compile the test data, and submit six copies of the complete test data to the Contractor for forwarding to the Owners for evaluation and approval.

OR

H. Testing Procedure: The Contractor shall perform the testing and balancing of air and water systems in accordance with AABC National Standards for field measurement and instrumentation, Volume 1, NEBB, or TABB. All tests described in same shall be performed the same as if written herein.

I. References

1. AABC — National Standards for Total Systems Balance
2. ADC — Test Code for Grilles, Registers, and Diffusers.
5. SMACNA — HVAC Systems Testing, Adjusting, and Balancing.

J. Submittals

1. Submit name of testing, adjusting, and balancing agency for approval within 30 days after award of contract.
2. Field Reports: Indicate deficiencies in systems that would prevent proper testing, adjusting, and balancing of systems and equipment to achieve specified performance.
3. Submit draft copies of report for review prior to final acceptance of project. Provide final copies for architect/engineer and for inclusion in operating and maintenance manuals.
4. Provide reports in soft cover, letter size, binder manuals, and complete with index page and indexing tabs with cover identification at front and side. Include set of reduced drawings with air outlets and equipment identified to correspond with data sheets and indicating thermostat locations.

K. Quality Assurance

1. Perform total system balance in accordance with AABC National Standards for Field Measurement and Instrumentation, Total System Balance, or NEBB Standards — Procedural Standards for Testing, Adjusting, and Balancing or
Environmental Systems or Testing, Adjusting, and Balancing Bureau (TABB) -
National Standards for Environmental Systems Balance.

2. Maintain one copy of applicable standards on site.

L. Qualifications

1. Agency: Company specializing in the testing, adjusting, and balancing of systems
   specified in this section with a minimum of 3 years of experience.

M. Products

1. Replacement of adjustable pulleys, additional balancing dampers, additional fan
   belts, pressure taps, and fitting, hydronic balancing valves and any other devices or
   equipment required to effect proper testing, adjusting, and balancing shall be
   provided by the Contractor at no additional cost to the Owner.

N. Execution

1. Examination: Verify systems are complete and operable before commencing work.
   Ensure the following conditions:

   (1) Systems are started and operating in a safe and normal condition.

   (2) Temperature control systems are installed complete and operable.

   (3) Proper thermal overload protection is in place for electrical equipment.

   (4) Final filters are clean and in place. If required, install temporary media in
       addition to final filters.

   (5) Duct systems are clean of debris.

   (6) Fans are rotating correctly.

   (7) Fire and volume dampers are in place and open.

   (8) Air coil fins are cleaned and combed.

   (9) Access doors are closed and duct end caps are in place.

   (10) Air outlets are installed and connected.

   (11) Duct system leakage is minimized. Duct systems having more than 25% duct
       surface area in unconditioned or indirectly conditioned spaces shall be sealed
       with leakage not greater than 6% of fan airflow, confirmed through diagnostic
       testing and field verification.

2. Submit field reports. Report defects and deficiencies noted during performance of
   services, which prevent system balance.

3. Beginning of work means acceptance of existing conditions.
O. Installation Tolerances

1. Air Handling Systems: Adjust to within plus or minus 6 percent of design for supply systems and plus or minus 10 percent of design for return and exhaust systems.

2. Air Outlets and Inlets: Adjust total to within plus 6 percent and minus 10 percent of design to space. Adjust outlets and inlets in space to within plus or minus 10 percent of design.

P. Adjusting - General

1. Ensure recorded data represents actual measured or observed conditions.

2. Permanently mark setting of valves, dampers, and other adjustment devices allowing setting to be restored. Set and lock memory stops.

3. After adjustment take measurement to verify balance has not been disrupted or that such disruption has been rectified.

4. Leave systems in proper working order, replacing belt guards, closing access doors, closing doors to electrical switch boxes, and restoring thermostats to specified settings.

5. At final inspection, recheck random selections of data recorded in report. Recheck points or areas as selected and witnessed by the Owner.

6. Check and adjust systems approximately 6 months after final acceptance and submit report.

Q. Air Systems Procedure

1. Test and adjust fan RPM to design requirements.

2. Test and record motor full load nameplate rating and actual ampere draw.

3. Test and record system static pressures, fan suction, and discharge.

4. Adjust all main supply and return duct to properly design CFM.

5. Test and adjust each diffuser, grille, and register. Reading and tests of diffusers, grilles, and registers shall include design velocity FPM and as adjusted velocity design CFM and adjusted CFM.

6. Test and record outside, mixed air, and discharge temperatures (db for heating cycle, db and wb for cooling cycle).

7. In coordination with the ATC Contractor, set adjustments of automatically operated dampers to operate as specified, indicated and/or noted.

8. Test and adjust air handling and distribution systems to provide required or design supply, return, outside and exhaust air quantities.

9. Make air quantity measurements in ducts by Pitot tube traverse of entire cross-sectional area of duct.
10. Measure air quantities at air inlets and outlets.

11. Adjust distribution system to obtain uniform space temperatures free from objectionable drafts and noise.

12. Use volume control devices to regulate air quantities only to extend that adjustments do not create objectionable air motion or sound levels. Effect volume control by duct internal devices such as dampers and splitters.

13. Vary total system air quantities by adjustment of fan speeds. Provide drive changes required. Vary branch air quantities by damper regulation.

14. Provide system schematic with required and actual air quantities recorded at each outlet or inlet.

15. Measure static air pressure conditions on air supply units, including filter and coil pressure drops, and total pressure across the fan. Make allowances for 50 percent loading of filters.

16. Adjust outside air automatic dampers, outside air, return air, and exhaust dampers for design conditions.

17. Measure temperature conditions across air, return air, and exhaust dampers to check leakage.

18. Where modulating dampers are provided, take measurement and balance at extreme conditions.

R. Required Reports to BeSubmitted

1. Report Forms

   (1) Title Page

   a. Name of Testing, Adjusting, and Balancing Agency
   b. Address of Testing, Adjusting, and Balancing Agency
   c. Telephone Number of Testing, Adjusting, and Balancing Agency
   d. Project Name
   e. Project Location
   f. Project Architect
   g. Project Engineer
   h. Project Contractor
   i. Project Altitude
   j. Report Date
(2) Summary Comments
   a. Design Versus Final Performance
   b. Notable Characteristics of System
   c. Description of System Operation Sequence
   d. Summary of Outdoor and Exhaust Flows to indicate of Building Pressurization
   e. Nomenclature used Throughout the Report
   f. Test Conditions Instrument List

(3) Instrument List
   a. Instrument
   b. Manufacturer
   c. Model Number
   d. Serial Number
   e. Range
   f. Calibration Date

(4) Electric Motors
   a. Manufacturer
   b. Model/Frame
   c. HP/BHP
   d. Phase, Voltage, Amperage, Nameplate, Actual, No Load
   e. RPM
   f. Service Factor
   g. Starter Size, Rating, Heater Elements
   h. Sheave Make/Size/Bore

(5) V-Belt Drive
   a. Identification/Location
   b. Required Driven RPM
c. Driven Sheave, Diameter, and RPM

d. Belt, Size, and Quantity

e. Motor Sheave Diameter and RPM

f. Center to Center Distance, Maximum, Minimum, and Actual

(6) Cooling Coil

a. Number/Number

b. Location

c. Service

d. Actual Outside Airflow

e. Return Air Temperature

f. Outside Air Temperature

g. Required Mixed Air Temperature

h. Actual Mixed Air Temperature

i. Design Outside/Return Air Ratio

j. Actual Outside/Return Air Ratio

(7) Heating Coil Data

a. Number/Number

b. Location

c. Service

d. Actual Outside Airflow

e. Return Air Temperature

f. Outside Air Temperature

g. Required Mixed Air Temperature

h. Actual Mixed Air Temperature

i. Design Outside/Return Air Ratio

j. Actual Outside/Return Air Ratio

(8) Exhaust Fan Data
(9) Duct Traverse
   a. System Zone/Branch
   b. Duct Size
   c. Area
   d. Design Velocity
   e. Design Airflow
   f. Test Velocity
   g. Test Airflow
   h. Duct Static Pressure
   i. Air Temperature
   j. Air Correction Factor
   k. Airflow, Design, and Actual

(10) Air Moving Equipment
   a. Location
   b. Manufacturer
   c. Model Number
d. Serial Number

e. Arrangement/Class/Discharge

f. Airflow, Specified, and Actual

g. Return Airflow, Specified, and Actual

h. Outside Airflow, Specified, and Actual

i. Total Static Pressure (Total External) Specified, and Actual

j. Inlet Pressure

k. Discharge Pressure

l. Sheave Make/Size/Bore

m. Number of Belts/Make/Size

n. Fan RPM

(11) Return Air/Outside Air Data

a. Identification/Location

b. Design Airflow

c. Design Return Airflow

d. Actual Return Airflow

e. Design Outside Airflow

(12) Air Distribution Test Sheet

a. Air Terminal Number

b. Room Number/Location

c. Terminal Type

d. Terminal Size

e. Area Factor

f. Design Velocity

g. Design Airflow

h. Test (Final) Velocity

i. Test (Final) Airflow
3.11 OPERATING AND MAINTENANCE MANUALS:

A. The Contractor shall furnish three Operating and Maintenance Manuals. The information in these manuals shall be bound in a hardback, loose-leaf binder or approved equivalent. The following shall be inscribed on the cover: the words “OPERATING AND MAINTENANCE MANUAL,” the name and location of the building or project, and the name of the Contractor. The following shall be included in the Manual:

1. Identification: The Manual shall include the names, addresses and telephone numbers of each Sub-Contractor installing equipment and systems and of the local representative for each major item of equipment.

2. Index: The Manual shall have a Table of Contents and information shall be assembled with tab sheets to conform to the Table of Contents.

3.12 OPERATING AND MAINTENANCE INSTRUCTIONS:

A. Manufacturer’s Literature: Manufacturer’s instructions for operation and maintenance of all mechanical equipment, including replacement parts list.

B. Written Instruction: Typewritten instructions for operation and maintenance of the system composed of Operation Instruction, Maintenance Instructions and Maintenance Schedule.

C. Operation and Maintenance Instructions: A brief description of the system indicating proper setting of switches and other equipment shall be furnished for the purpose of providing control of the system and its components by the operator.

D. Maintenance Schedule: A list of each item of equipment requiring maintenance, showing all the components of each item of equipment, and the month of the year (service schedule) when each item or component of equipment should be inspected or serviced, as recommended and scheduled by the manufacturers.

E. Verbal Instructions: Upon completion of the work, and at a time designated by the Owner, a competent Engineer from each supplier of major items or equipment shall be furnished to instruct the Owner’s representative in the operation and maintenance of the equipment supplied by his company.

F. Mounting Frames: Wood frame and glass cover of adequate size to mount directories and typewritten instructions, securely mounted where indicated by the Owner, shall be provided.

G. Binders: A complete set of the above data along with control diagrams as installed, typewritten sequence of operations, complete catalog data, calibration information, spare parts lists, etc., for all control equipment shall be placed in a loose leaf binder with permanent cover, permanent identification section dividers and index. Provide three complete sets and deliver to the Owner.

1. Manufacturer’s Literature: Include Manufacturer’s literature for all mechanical equipment. All equipment shall be identified by make, model and serial number. Electrical characteristics shall be noted. A complete parts list shall be included.
2. Operating Instructions: Provide a brief description of the system including proper setting of switches and other equipment. This may be provided as a part of the manufacturer’s literature. If included in literature provide an index indicating on what page each item is located. Adjustments requiring the technical knowledge of the service agency personnel need not be included.

3. Maintenance Instructions: Provide a list of each item of mechanical equipment requiring inspection, lubrication or service with a description of the schedule and performance of such maintenance including types of lubricant for each item of equipment. This may be provided as a part of the Manufacturer’s Literature. If included in literature provide an index indicating on what page each item is located.

4. Controls: Provide system control drawings including complete catalog data, calibration information, spare parts lists, etc. A typewritten sequence shall be included with the diagram referring to component numbers or designations hereon.

3.13 POSTED OPERATING INSTRUCTIONS:

A. Provide directories, control diagrams, and sequence of operation.

B. The above shall be mounted in a wood frame with glass cover of sufficient size and mounted in the equipment room or where directed by the Architect.

END OF SECTION
SECTION 15838
VEHICLE EXHAUST REMOVAL SYSTEM

PART 1 - GENERAL

1.01 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, motors, fittings, louvers, ductwork, blower(s), labor and all other equipment and materials specified shall be part of the bidder’s work. Bidder to confirm existing inventory with Plymovent representative. See sheet M0.1 for contact information.

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 two (2) years 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 bidder’s 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 Sliding Balancer Track 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 25 feet away from the exiting door. The system must be able to accommodate 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. Due to the harmful effects of diesel exhaust, the system must be designed and
capable of capturing 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 than normal exiting of the apparatus bay. No exception to this requirement will be allowed.

6. Vehicle must be able to perform pump checks while connected to the system and capture 100% of the diesel exhaust.

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

1.02 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.

1.03 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.

1.04 EQUIPMENT WARRANTY

The bidder shall guarantee all materials, equipment and workmanship for a period of two (2) years 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.

1.05 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.

1.06 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 then eight (8) 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.
PART II - PRODUCTS

2.01 SYSTEM MANUFACTURER

All equipment specified herein shall be a standard product of the manufacturer, or an approved equal. An approved equal shall be determined by the fire department. The bidder shall provide all labor and materials required to install and operate the Diesel Exhaust Removal System which shall be included in the following performance and technical specifications. Any adjustments involving equipment locations within the building shall be determined in the field and approved by the fire department.

2.02 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 Almag 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 housing shall be manufactured from a nonferrous material – Alum. (or) approved equivalent. The fan motor and assembly shall be mounted on a stainless 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 TEFLOm 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.

2.03 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. The electrical trolley shall include a limited energy control circuit. 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 controller 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 multitap 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 radiiuses 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. This schematic shall be provided as a "D" size print drawing.

J. Electrical Interface

To protect the apparatus and communications, designs that incorporate the use of a controller that utilizes or produces an electrical frequency transmission or any possibility of electrical back-feed which may interfere with a central services communication or onboard vehicle computer logic or navigational equipment will not be accepted.

K. Controller Performance

It shall be designed to sense the output pressure, which is normally generated by any internal combustion engine designed to propel a motor vehicle. The operating logic shall be designed to complete this cycle. At any point in time when a collection device is connected to a motor vehicle’s exhaust tailpipe, at which time the operator manually or automatically starts the vehicle, this controller shall automatically sense the engine’s output pressure and in turn energize the electrical contactors which will provide proper full load amperage to the exhaust removal system fan motor. The controller through the use of an adjustable timer shall keep the contactors energized for up to five minutes in accordance with the station response requirement. If the responding vehicle does not disconnect from the exhaust ventilation system in less than the designated setting, a temperature override switch shall be incorporated to override the timer delay relay to ensure continuous system operation. This automated function will work for as long as the exhaust gas temperature is in excess of setting on heat sensor located in the ductwork. This cycle shall not allow the electrical contactor, which energizes the exhaust fan, to short cycle or stop the fan while the system is connected to an operating vehicle.

2.04 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, laser welded, pipe construction, with the range of available sizes not to exceed 10 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" - 7" dia. shall be 26 gauge standard spiral pipe and 9" - 10" 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 factory fabricated fittings or factory fabricated duct/tap assemblies. Fittings shall be constructed so that air stream converge at angles no greater than 45 degree. All seams shall be continuous stitch welded and if necessary internally sealed to ensure airtightness. Turning elbows shall be laser welded and used for all diameters and pressures. They shall be fabricated of 24 gauge galvanized steel and constructed as two piece with continuous welded seam construction fittings. 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.

2.05 VEHICLE EXHAUST REMOVAL SYSTEM EQUIPMENT

A. Scope of System Operation

The vehicle exhaust removal system shall capture approximately 100 % of the exhaust emission 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 pneumatically operated collection nozzle shall be connected to the motor vehicle’s exhaust tailpipe, when the vehicle is started by the 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, a temperature override switch shall be incorporated to override the timer relay. This override shall be achieved by means of an adjustable temperature sensor located inside the exhaust ductwork. The adjustable temperature (heat) sensor shall have a range of 90-130 degrees. If the vehicle is still running inside the station longer than anticipated, the heat sensor will override the timer relay. The pneumatic connection device shall stay connected to the vehicle tailpipe as it travels to the exit door in a pre-engineered sliding track system. The sliding track 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 release its air pressure automatically therefore releasing the nozzle from the tailpipe. This shall be accomplished by means of an uncoupling valve strategically located on the sliding track. 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 with the pneumatic slide valve in his left hand, shall slide the connection device up against a flanged adapter attached to the vehicle tailpipe; the operator will then inflate the pneumatic nozzle around tailpipe. The cycle is completed as the exhaust fan starts and vents the toxic gases with the pneumatic connection nozzle firmly attached to the vehicle exhaust pipe. The vehicle then proceeds to its designated resting position.

B. Sliding Track

The sliding track shall be a one-piece continuous extruded aluminum track in a minimum length of 20 feet. The construction profile shall be of a boxloc type profile, which shall adhere to the following dimensions. Track height 3 1/8", width 1 1/2", thickness 1/8". The track material shall be aircraft aluminum alloy type AA-6063. The aluminum track shall be an extruded design that shall incorporate three separate and functioning channels. The three channels shall be for the following, mounting channel, trolley channel and the boxloc channel. Each of these sections performs a specific function to make the system work effectively. The mounting compartment shall be designed to accept the slider bars (which shall be provided with factory supplied vertical legs and riser clamp duct connection) and allow positioning along the full length of the slotted track mounting channel. The mounting channel shall also accommodate the compressed airlines for the purposes of safe storage and appearance. The trolley channel shall allow the trolley/balancer/hose assembly to glide to the door threshold in a safe and effective manner. The boxloc channel shall allow the whole track to remain rigid as it hangs from factory supplied leg supports and also shall provide an area to attach bolts for splicing additional tracks together for systems over 20 feet long. The overall extruded track lengths shall be 20 foot standard and weight no more than 35 lbs. The track system shall be equipped with end stops that limit travel of flex hose as the vehicle exits the building. The end stop shall be fabricated of zinc plated steel in a U shape form, with a rubber end stop on the impact end. It shall be attached by using a 1/4” molded locking bolt. The end stop shall be secured to the track with no loss than (2) 1/4” bolts and locking nuts located on the underside of the track. For security, a 1/4” bolt shall be drilled through the ends of each track system to insure that the trolley/balancer assembly(s) roll no further then the end of the track system.

C. Support Legs

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Woodside, California 15838-7
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 support leg shall be equipped with round tubular zinc-plated steel with pressed ends. 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. Double Track Joiner Plate

Should the exhaust removal system require a double track type system due to the length of the apparatus bays, the tracks shall be attached in the following manner. The joiner plate shall be constructed from a minimum of 1/4 " thick zinc-plated material and be designed to connect two parallel tracks to make a double track system to accommodate an apparatus bay over 40 feet in length. The joiner plate shall be 10" x 8" flat zinc-plated steel and designed to attach the two tracks to a single factory supplied support leg. The steel plate shall have (6) 3/8" holes drilled 6 7/8" apart to accommodate the slider bar provided with factory sup-port legs. The joiner plate shall have two slider bars attached to the plate and shall be located on the outside edges of plate, these slider bars shall fit into the boxloc track mounting channel for a simple and secure attachment of the plate to boxloc track. The center portion of the joiner plate shall provide attachment for the factory supplied support leg.

E. Track Splicing Assembly

The track splicing assembly shall be fabricated for the sole function of connecting two extruded aluminum boxloc sliding tracks end-to-end. Track splice shall be manufactured of galvanized steel in two parts and utilized as a clamping device. This clamp shall accurately secure both tracks together in a fashion, which shall eliminate any possibility of obstructing the trolley assembly as it passes through this connection point of track system. Connecting length of splice shall be a mini-mum of 15 3/4" long and fabricated of 14 gauge material. Four 1/4" bolts with lock nuts shall pass directly through internal partition of boxloc track. The splicing sleeve shall fit externally around the outside dimension of extruded aluminum track profile.

F. Riser Clamp Assembly

The riser clamp shall be fabricated as a one piece welded assembly and manufactured to create the transfer of the hard spiral pipe joined at the top and flexible duct connection at the bottom. The riser clamp shall be pre-drilled to mount an air regulator assembly for the pneumatic nozzle and to accept airlines that pass through airtight seals mounted to riser pipe. A slider bar and associated hardware shall be provided with riser clamp assembly. Sizes of the riser clamp will range from 3" - 6 " diameter to match the output velocity of the vehicles that will park in that station.

G. Accutrack Trolley / Balancer Assembly

The trolley assembly shall be manufactured as a two piece galvanized steel assembly including bumper stops at each end. Fixed to the side of the trolley are solid steel pins, which shall be for load carrying bearings that are sealed and permanently lubricated. The
Load carrying bearings shall travel internally in track trolley channel. Two additional permanently lubricated trolley wheels shall be provided on bottom side of the track to reduce wobble of trolley as it conveys the hose assembly to the door threshold. A release plate shall be attached to the chassis of the trolley to smoothly energize the uncoupling release valve when the trolley-balancer assembly approaches the door threshold. The system balancer assembly shall be a self-adjusting weight spring tension balancer with a lifting capacity of no less than 31 Lb. The balancer shall have a minimum diameter stainless steel cable of .080 and a safety link connection. The system supplier shall manufacture the balancer and trolley for the sole purpose of conveying the flexible hose to the door threshold for automatic release of the system. 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 Riser Clamp Assembly/Hose Drop or to the boxloc track 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, and which can be visibly read from standing on the bay floor.

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 single direction action and affixed to a mounting bracket, which can be easily positioned and adjusted along the full length of the extruded aluminum track profile. The mounting bracket shall be formed from a minimum of 16 gauge galvanized steel and designed to fit snugly over the top of the boxloc track system. A 1/2 " opening shall be centered to the top side of bracket to accommodate a 1 " x 1/2 " bolt with a 1/2 " plated 1 1/2 " long bar providing the secure attachment of Uncoupling Valve when system is put into service. The release valve shall be set for the maximum exiting speed of the vehicle.

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 be restricted 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 the nozzle gets entangled.

L. Safety Disconnect Coupling

A rubber 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 a reusable rubber band. 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 a 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 capture velocity 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. Manual Fill Valve

A manual Connection fill valve shall be located one foot above safety release coupling approximately 4 feet from floor and shall be of a sliding/push button type for manual or automatic release. This valve shall incorporate in its design a handle, which the operator may easily operate in a standing position. The attachment of collection nozzle shall not position the operator’s breathing zone closer than 44” from the exhaust tail pipe. The Automatic release of the connection valve shall be no greater than 3 psi. shift pressure to activate the automatic nozzle deflation. The primary air supply shall be accomplished by means of compression type fitting. The regulated air supply line to collection nozzle shall
be designed to safety release from the upper hose at pressure no greater than 80 lbs. Since this is a safety item no exception will be tolerated.

O. Compressed Air Features

Airlines shall be 1/4" (6mm) OD tubing capable of exposure of high temperature air stream inside the ventilation hose and duct. The airlines shall be fed through the exterior of the hose and ductwork by the use of substantially air tight chrome fittings. Unless a fire station air compressor is to be utilized the bidder shall provide a quiet operating compressor to be located accessible to the vehicle bays. It shall also located so that preventative maintenance can be performed quickly and effectively. The operation of compressor running inside station shall not generate sound decibels in excess of 25 dba. The compressor shall be equipped with a filter/dryer to insure the conveyance of clean dry air to the pneumatic controls incorporated in the auto-release ventilation system.

P. Hose Saddle

A hose suspension saddle shall be fabricated of a rubber molded cushion specifically manufactured for the sole purpose of suspending high temperature exhaust ventilation hose in a rapid response and auto-release application. 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.

Q. 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. A special emergency disconnect feature shall be provided to enable the vehicle to back off the system through a rear exit door. Unique occasions may require the emergency vehicle to depart from the back door in a drive through station. Also a malfunction of the front over-head door may force the vehicle to exit from the station outside the confines of normal operation. 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.

R. Vehicle Tailpipe Modification

The bidder shall supply a drawing for the precise modification procedure for the vehicles 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. The manufacturers supplied adapter shall securely attach to the vehicle tailpipe. The flange shall be fabricated from 14 gauge-aluminized steel. Two sections (or) half s shall be provided for simple attachment to vehicles tailpipe. The sections shall be bolted together with four (4) 3/4" x 1- 1/2" long bolts and nuts.
PART III - TRAINING

2.06 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 7 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 training video shall be provided to the fire department.

END OF SECTION
SECTION 16150
STANDBY GENERATING SYSTEM

PART 1 - GENERAL

1.1 SUMMARY

A. The contractor shall provide and install a complete code compliant diesel engine generator with ATS system. This Section includes packaged engine-generator sets for standby power supply with the following features:

1. Diesel engine.
2. Outdoor enclosure Nema 3R enclosure.
3. Automatic Transfer Switch.

1.2 SUBMITTALS

A. Product Data: For each type of packaged engine generator and accessory indicated.

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.

C. Manufacturer Seismic Qualification Certification: Submit certification that engine-generator set, batteries, battery racks, accessories, and components will withstand seismic forces defined in Division 26 Section "Vibration and Seismic Controls for Electrical Systems." 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.

D. Source quality-control test reports.

E. Field quality-control test reports.

F. Operation and maintenance data.

G. Warranty: Special warranty specified in this Section.
1.3 QUALITY ASSURANCE

A. Installer Qualifications: Manufacturer's authorized representative who is trained and approved for installation of units required for this Project.

B. Manufacturer Qualifications: A qualified manufacturer. Maintain, within 40 miles of Project site, a service center capable of providing training, parts, and emergency maintenance repairs available 24 hours / 7 days a week.

C. 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.

D. Comply with ASME B15.1.

E. Comply with NFPA 37.

F. Comply with NFPA 70.

G. Comply with NFPA 99.

H. Comply with NFPA 110 requirements for Level 1 standby power supply system.

I. Comply with UL 2200.

J. Engine Exhaust Emissions: Comply with applicable state and local government requirements to include all APCD requirements.

K. Noise Emission: Comply with applicable state and local government requirements for maximum noise level at adjacent property boundaries due to sound emitted by generator set including engine, engine exhaust, engine cooling-air intake and discharge, and other components of installation.

1.4 PROJECT CONDITIONS

A. Environmental Conditions: Engine-generator system shall withstand the following environmental conditions without mechanical or electrical damage or degradation of performance capability:

1. Ambient Temperature: 25F to 122F.
2. Relative Humidity: 0 to 95 percent.
3. Altitude: Sea level to 100 feet.

1.5 WARRANTY

A. Special Warranty: Manufacturer's standard form in which 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: 40 5 years from date of Substantial Completion.
PART 2 - PRODUCTS

2.1 MANUFACTURERS

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. Caterpillar; Engine Div.
2. Kohler Co.; Generator Division.
4. Detroit Diesel.

2.2 ENGINE-GENERATOR SET

A. Factory-assembled and -tested, engine-generator set.

B. Mounting Frame: Maintain alignment of mounted components without depending on concrete foundation; and have lifting attachments.

C. Capacities and Characteristics:

1. Power Output Ratings: Nominal ratings as indicated, with capacity as required to operate as a unit as evidenced by records of prototype testing.
2. Output Connections: Three-phase, four wire.
3. Nameplates: For each major system component to identify manufacturer's name and address, and model and serial number of component.

D. Generator-Set Performance:

1. Steady-State Voltage Operational Bandwidth: 3 percent of rated output voltage from no load to full load.
2. 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 three seconds.
3. Steady-State Frequency Operational Bandwidth: 0.5 percent of rated frequency from no load to full load.
4. 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.
5. 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.
6. 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.
7. Sustained Short-Circuit Current: For a 3-phase, bolted short circuit at system output terminals, system shall supply a minimum of 250 percent of rated full-load current for not less than 10 seconds and then clear the fault automatically, without damage to generator system components.
8. Start Time: Comply with NFPA 110, Type 10, system requirements.
2.3 ENGINE

A. Fuel: **Diesel.**

B. Rated Engine Speed: 1800 rpm.

C. Maximum Piston Speed for Four-Cycle Engines: **2250 fpm (11.4 m/s).**

D. Lubrication System: The following items are mounted on engine or skid:
   1. Filter and Strainer: Rated to remove 90 percent of particles 5 micrometers and smaller while passing full flow.
   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.

E. Engine Fuel System:
   2. Relief-Bypass Valve: Automatically regulates pressure in fuel line and returns excess fuel to source.
   3. Dual Natural Gas with LP-Gas Backup (Vapor-Withdrawal) System:
      a. Carburetor.
      b. Secondary Gas Regulators: One for each fuel type.
      c. Fuel-Shutoff Solenoid Valves: One for each fuel source.
      d. Flexible Fuel Connectors: One for each fuel source.

F. Coolant Jacket Heater: Electric-immersion type, factory installed in coolant jacket system. Comply with NFPA 110 requirements for Level 1 equipment for heater capacity.

G. Governor: Adjustable isochronous, with speed sensing.

H. Cooling System: Closed loop, liquid cooled, with radiator factory mounted on engine-generator-set mounting frame and integral engine-driven coolant pump.
   1. Coolant: Solution of 50 percent ethylene-glycol-based antifreeze and 50 percent water, with anticorrosion additives as recommended by engine manufacturer.
   2. Temperature Control: Self-contained, thermostatic-control valve modulates coolant flow automatically to maintain optimum constant coolant temperature as recommended by engine manufacturer.

I. Muffler/Silencer: Critical type, sized as recommended by engine manufacturer and selected with exhaust piping system to not exceed engine manufacturer's engine backpressure requirements.
   1. Minimum sound attenuation of 25 dB at 500 Hz.
   2. Sound level measured at a distance of 23 feet from exhaust discharge after installation is complete shall be 85dBA or less.

J. Air-Intake Filter: **Heavy**-duty, engine-mounted air cleaner with replaceable dry-filter element and "blocked filter" indicator.
K. Starting System: **12 or 24-V electric, with negative ground.**

1. Components: Sized so they will not be damaged during a full engine-cranking cycle with ambient temperature at maximum specified in Part 1 "Project Conditions" 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: Adequate capacity within ambient temperature range specified in Part 1 "Project Conditions" Article to provide specified cranking cycle at least twice without recharging.
   a. Battery Charger: Current-limiting, automatic-equalizing and float-charging type. Unit shall comply with UL 1236.

2.4 FUEL OIL STORAGE

A. Comply with NFPA 30.

B. Base-Mounted Fuel Oil Tank: Factory installed and piped, complying with UL 142 fuel oil tank. Features include the following:

1. Tank level indicator.
2. Capacity: Fuel for 24-72 hours’ continuous operation at 100 percent rated power output.
3. Vandal-resistant fill cap.

2.5 CONTROL AND MONITORING

A. Automatic Starting System Sequence of Operation: When mode-selector switch on the control and monitoring panel is in the automatic position, remote-control contacts in one or more separate automatic transfer switches initiate starting and stopping of generator set. When mode-selector switch is switched to the on position, generator set starts. The off position of same switch initiates generator-set shutdown. When generator set is running, specified system or equipment failures or derangements automatically shut down generator set and initiate alarms.

B. Manual Starting System Sequence of Operation: Switching on-off switch on the generator control panel to the on position starts generator set. The off position of same switch initiates generator-set shutdown. When generator set is running, specified system or equipment failures or derangements automatically shut down generator set and initiate alarms.

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 generator set. Mounting method shall isolate the control panel from generator-set vibration.

D. Indicating and Protective Devices and Controls: As required by NFPA 110 for Level [1] [2] system, and the following:

1. AC voltmeter.
2. AC ammeter.
3. AC frequency meter.
4. DC voltmeter (alternator battery charging).
5. Engine-coolant temperature gage.
6. Engine lubricating-oil pressure gage.
7. Running-time meter.
9. Generator-voltage adjusting rheostat.
10. Fuel tank derangement alarm.
11. Fuel tank high-level shutdown of fuel supply alarm.
12. Generator overload.

E. Supporting Items: Include sensors, transducers, terminals, relays, and other devices and include wiring required to support specified items. Locate sensors and other supporting items on engine or generator, unless otherwise indicated.

F. Common Remote Audible Alarm: Comply with NFPA 110 requirements for Level 1 systems. Include necessary contacts and terminals in control and monitoring panel.

1. Overcrank shutdown.
2. Coolant low-temperature alarm.
3. Control switch not in auto position.
4. Battery-charger malfunction alarm.
5. Battery low-voltage alarm.

G. Remote Alarm Annunciator: Comply with NFPA 99. An LED 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.

2.6 GENERATOR OVERCURRENT AND FAULT PROTECTION

A. Generator Circuit Breaker: Molded-case, thermal-magnetic type; 100 percent rated; complying with NEMA AB 1 and UL 489.

1. Tripping Characteristic: Designed specifically for generator protection.
2. Trip Rating: Matched to generator rating.
3. Shunt Trip: Connected to trip breaker when generator set is shut down by other protective devices.
4. Mounting: Adjacent to or integrated with control and monitoring panel.


2.7 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. 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.

F. Enclosure: Dripproof.

G. Instrument Transformers: Mounted within generator enclosure.

H. Voltage Regulator: Solid-state type, separate from exciter, providing performance as specified.
   1. Adjusting rheostat on control and monitoring panel shall provide plus or minus 5 percent adjustment of output-voltage operating band.

I. Strip Heater: Thermostatically controlled unit arranged to maintain stator windings above dew point.

J. Windings: Two-thirds pitch stator winding and fully linked amortisseur winding.

K. Subtransient Reactance: 12 percent, maximum.

2.8 OUTDOOR GENERATOR-SET ENCLOSURE

A. Description: NEMA 3R rated, Vandal-resistant, weatherproof steel housing, wind resistant up to 100 mph. Multiple panels shall be lockable and provide adequate access to components requiring maintenance. Panels shall be removable by one person without tools. Instruments and control shall be mounted within enclosure.

B. Enclosure dimension, to include fuel tank enclosure, shall not exceed 240”L x 120”W x 160”H. NO EXCEPTIONS.

C. Engine Cooling Airflow through Enclosure: Maintain temperature rise of system components within required limits when unit operates at 110 percent of rated load for 2 hours with ambient temperature at top of range specified in system service conditions.
   1. Louvers: Fixed engine, cooling-air inlet and discharge. Storm-proof and drainable louvers prevent entry of rain and snow.
   2. Automatic Dampers: At engine cooling-air inlet and discharge. Dampers shall be closed to reduce enclosure heat loss in cold weather when unit is not operating.

D. Interior Lights with Switch: Factory-wired, vaporproof-type fixtures within housing; arranged to illuminate controls and accessible interior. Arrange for external electrical connection.
   1. AC lighting system and connection point for operation when remote source is available.
   2. DC lighting system for operation when remote source and generator are both unavailable.

E. Convenience Outlets: Factory wired, GFCI. Arrange for external electrical connection.

2.9 AUTOMATIC TRANSFER SWITCHES

A. Comply with Level 1 equipment according to NFPA 110.
B. Shall be furnished by the diesel engine manufacturer.

C. Switching Arrangement: Double-throw type, incapable of pauses or intermediate position stops during normal functioning, unless otherwise indicated.

D. Signal-Before-Transfer Contacts: A set of normally open/normally closed dry contacts operates in advance of retransfer to normal source. Interval is adjustable from 1 to 30 seconds.

E. Transfer Switches Based on Molded-Case-Switch Components: Comply with NEMA AB 1, UL 489, and UL 869A.

F. In-Phase Monitor: Factory-wired, internal relay controls transfer so it occurs only when the two sources are synchronized in phase.

G. Motor Disconnect and Timing Relay: Controls designate starters so they disconnect motors before transfer and reconnect them selectively at an adjustable time interval after transfer. Time delay for reconnecting individual motor loads is adjustable between 1 and 60 seconds, and settings are as indicated.

H. Programmed Neutral Switch Position: Switch operator has a programmed neutral position arranged to provide a midpoint between the two working switch positions, with an intentional, time-controlled pause at midpoint during transfer.

I. Automatic Transfer-Switch Features:

1. Undervoltage Sensing for Each Phase of Normal Source: Sense low phase-to-ground voltage on each phase. Pickup voltage shall be adjustable from 85 to 100 percent of nominal, and dropout voltage is adjustable from 75 to 98 percent of pickup value. Factory set for pickup at 90 percent and dropout at 85 percent.

2. Adjustable Time Delay: For override of normal-source voltage sensing to delay transfer and engine start signals. Adjustable from zero to six seconds, and factory set for one second.

3. Voltage/Frequency Lockout Relay: Prevent premature transfer to generator. Pickup voltage shall be adjustable from 85 to 100 percent of nominal. Factory set for pickup at 90 percent. Pickup frequency shall be adjustable from 90 to 100 percent of nominal. Factory set for pickup at 95 percent.

4. Time Delay for Retransfer to Normal Source: Adjustable from 0 to 30 minutes, and factory set for 10 minutes to automatically defeat delay on loss of voltage or sustained undervoltage of emergency source, provided normal supply has been restored.

5. Test Switch: Simulate normal-source failure.

6. Switch-Position Pilot Lights: Indicate source to which load is connected.


   a. Normal Power Supervision: Green light with nameplate engraved "Normal Source Available."


8. Unassigned Auxiliary Contacts: Two normally open, single-pole, double-throw contacts for each switch position, rated 10 A at 240-V ac.

9. Transfer Override Switch: Overrides automatic retransfer control so automatic transfer switch will remain connected to emergency power source regardless of condition of normal source. Pilot light indicates override status.
10. Engine Starting Contacts: One isolated and normally closed, and one isolated and normally open; rated 10 A at 32-V dc minimum.

11. Engine Shutdown Contacts: Instantaneous; shall initiate shutdown sequence at remote engine-generator controls after retransfer of load to normal source.

12. Engine Shutdown Contacts: Time delay adjustable from zero to five minutes, and factory set for five minutes. Contacts shall initiate shutdown at remote engine-generator controls after retransfer of load to normal source.

13. Engine-Generator Exerciser: Solid-state, programmable-time switch starts engine generator and transfers load to it from normal source for a preset time, then retransfers and shuts down engine after a preset cool-down period. Initiates exercise cycle at preset intervals adjustable from 7 to 30 days. Running periods are adjustable from 10 to 30 minutes. Factory settings are for 7-day exercise cycle, 20-minute running period, and 5-minute cool-down period. Exerciser features include the following:
   a. Exerciser Transfer Selector Switch: Permits selection of exercise with and without load transfer.
   b. Push-button programming control with digital display of settings.
   c. Integral battery operation of time switch when normal control power is not available.

2.10 VIBRATION ISOLATION DEVICES

A. Elastomeric Isolator Pads: Oil- and water-resistant elastomer or natural rubber, arranged in single or multiple layers, molded with a nonslip pattern and galvanized-steel baseplates of sufficient stiffness for uniform loading over pad area, and factory cut to sizes that match requirements of supported equipment.
   1. Material: **Standard neoprene**.
   2. Durometer Rating: **30**.
   3. Number of Layers: **Two**.

B. Restrained Spring Isolators: Freestanding, steel, open-spring isolators with seismic restraint.
   1. Housing: Steel with resilient vertical-limit stops to prevent spring extension due to wind loads or if weight is removed; factory-drilled baseplate bonded to 1/4-inch- (6-mm-) thick, elastomeric isolator pad attached to baseplate underside; and adjustable equipment mounting and leveling bolt that acts as blocking during installation.
   2. Outside Spring Diameter: Not less than 80 percent of compressed height of the spring at rated load.
   3. Minimum Additional Travel: 50 percent of 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.

2.11 FINISHES

A. Indoor and Outdoor Enclosures and Components: Manufacturer's standard finish over corrosion-resistant pretreatment and compatible primer.
2.12 SOURCE QUALITY CONTROL

A. Prototype Testing: Factory test engine-generator set using same engine model, constructed of identical or equivalent components and equipped with identical or equivalent accessories.

2. Report factory test results within 10 days of completion of test.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Comply with packaged engine-generator manufacturers' written installation and alignment instructions and with NFPA 110.

B. Install packaged engine generator to provide access, without removing connections or accessories, for periodic maintenance.

C. Install packaged engine generator with restrained spring isolators having a minimum deflection of 1 inch on 4-inch high concrete base.

D. Install Schedule 40, black steel piping with welded joints and connect to engine muffler. Install thimble at wall. Piping shall be same diameter as muffler outlet. Flexible connectors and steel piping materials and installation requirements are specified in Division 23 Section "Hydronic Piping."

1. Install condensate drain piping to muffler drain outlet full size of drain connection with a shutoff valve, stainless-steel flexible connector, and Schedule 40, black steel pipe with welded joints. Flexible connectors and piping materials and installation requirements are specified in Division 23 Section "Hydronic Piping."

E. Electrical Wiring: Install electrical devices furnished by equipment manufacturers but not specified to be factory mounted.

F. Connect fuel, cooling-system, and exhaust-system piping adjacent to packaged engine generator to allow service and maintenance.

G. Connect engine exhaust pipe to engine with flexible connector.

H. Connect fuel piping to engines with a gate valve and union and flexible connector.

1. Natural-gas piping, valves, and specialties for gas distribution are specified in Division 23 Section "Facility Natural-Gas Piping."
2. LP-gas piping, valves, and specialties for gas piping are specified in Division 23 Section "Facility Liquefied-Petroleum Gas Piping."

I. Ground equipment according to Division 16 Section "Grounding and Bonding for Electrical Systems."

3.2 FIELD QUALITY CONTROL

A. Perform tests and inspections and prepare test reports.
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. Perform tests recommended by manufacturer and each electrical test and visual and mechanical inspection[except those indicated to be optional] for "AC Generators and for Emergency Systems" specified in NETA Acceptance Testing Specification. 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. 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 under 25 percent and at 100 percent of rated linear load. Verify that harmonic content is within specified limits.

10. Noise Level Tests: Measure A-weighted level of noise emanating from generator-set installation, including engine exhaust and cooling-air intake and discharge, at four locations, and compare measured levels with required values.

C. Coordinate tests with tests for transfer switches and run them concurrently.

D. Leak Test: After installation, charge system and test for leaks. Repair leaks and retest until no leaks exist.

E. Operational Test: After electrical circuitry has been energized, start units to confirm proper motor rotation and unit operation.

F. Test and adjust controls and safety devices. Replace damaged and malfunctioning controls and equipment.

G. Remove and replace malfunctioning units and retest as specified above.
H. Retest: Correct deficiencies identified by tests and observations and retest until specified requirements are met.

I. Report results of tests and inspections in writing. Record adjustable relay settings and measured insulation resistances, time delays, and other values and observations. Attach a label or tag to each tested component indicating satisfactory completion of tests.

3.3 DEMONSTRATION

A. Engage a factory-authorized service representative to train Owner's maintenance personnel to adjust, operate, and maintain packaged engine generators.

END OF SECTION
SECTION 16413
SWITCHBOARDS

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Service and distribution switchboards rated 600 V and less.
2. Transient voltage suppression devices.
3. Disconnecting and over current protective devices.
4. Instrumentation.
5. Control power.
6. Accessory components and features.
7. Identification.

1.2 SUBMITTALS

A. Product Data: For each type of product indicated.

B. Shop Drawings: For each switchboard and related equipment.

1. Include dimensioned plans, elevations, sections, and details, including required clearances and service space around equipment. Show tabulations of installed devices, equipment features, and ratings.
2. Include time-current coordination curves for each type and rating of over current protective device included in switchboards.
3. Include schematic and wiring diagrams for power, signal, and control wiring.
4. Submittal shall include interrupting capacities in RMS symmetrical amps at the applied voltage. Letter designators are not sufficient.

C. Seismic Qualification Certificates: Submit certification that switchboards, over current protective devices, accessories, and components will withstand seismic forces defined in Division 16 Section "Vibration and Seismic Controls for Electrical Systems."

D. Field quality-control reports.

E. Operation and maintenance data.

1.3 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. Comply with NEMA PB 2.
C. Comply with NFPA 70.
D. Comply with UL 891.

1.4 WARRANTY
A. Special Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace transient voltage suppression devices that fail in materials or workmanship within specified warranty period.

1. Warranty Period: One year from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 MANUFACTURED UNITS
A. Manufacturers: Subject to compliance with requirements, provide all products from the same manufacturer and by one of the following:

1. Eaton Electrical Inc.; Cutler-Hammer Business Unit.
4. Square D; a brand of Schneider Electric.

B. Nominal System Voltage: Per drawings.

C. Main-Bus Continuous: Per drawings.

D. Enclosure: Steel, NEMA 250, Nema Type per drawings.

1. Enclosure Finish: Factory-applied finish in manufacturer's standard gray finish over a rust-inhibiting primer on treated metal surface.

E. Utility Metering Compartment: Fabricated, barrier compartment and section complying with serving utility company's requirements. If separate vertical section is required for utility metering, match and align with basic switchboard. Provide service entrance label and necessary applicable service entrance features.

F. Bus Transition and Incoming Pull Sections: Matched and aligned with basic switchboard.

G. Hinged Front Panels: Allow access to circuit breaker, metering, accessory, and blank compartments.

H. Phase and Neutral Buses and Connections: Three phase, four wire unless otherwise indicated. Bussing shall be copper or aluminum.

1. Ground Bus: Hard-drawn copper of 98 percent conductivity, equipped with pressure connectors for feeder and branch-circuit ground conductors. The ampacity of the ground bus shall be sized to an ampacity of not less than 33% of the rating of the respective main bus.
2. Main Phase Buses and Equipment Ground Buses: Uniform capacity for entire length of switchboard's main and distribution sections. **Provide for future extensions from both ends.**

3. Neutral Buses: **100** percent of the ampacity of phase buses unless otherwise indicated, equipped with pressure connectors for outgoing circuit neutral cables.

I. Future Devices: Equip compartments with mounting brackets, supports, bus connections, and appurtenances at full rating of circuit-breaker compartment.

J. All lugs for cable connections shall be positive pressure bolted clamp type.

2.2 TRANSIENT VOLTAGE SUPPRESSION DEVICES

A. Surge Protection Device Description: IEEE C62.41-compliant, integrally mounted to not assume a circuit breaker position, solid-state, parallel-connected, with sine-wave tracking suppression and filtering modules, UL 1449, second edition, short-circuit current rating matching or exceeding the switchboard short-circuit rating, and with the following features and accessories:

1. Fuses, rated at 200-kA interrupting capacity.
2. LED indicator lights for power and protection status.
3. Audible alarm, with silencing switch, to indicate when protection has failed.
4. Form-C contacts rated at 5 A and 250-V ac, one normally open and one normally closed, for remote monitoring of system operation. Contacts shall reverse position on failure of any surge diversion module or on opening of any current-limiting device.
5. Transient-event counter set to totalize transient surges.

B. Peak Single-Impulse Surge Current Rating: **120 kA per mode/240 kA per phase.**

C. Withstand Capabilities: 5000 IEEE C62.41, Category C3 (10 kA), 8-by-20-mic.sec. surges with less than 5 percent change in clamping voltage.

D. Protection modes and UL 1449 SVR for grounded wye circuits with, three-phase, four-wire circuits shall be as follows:

1. Line to Neutral: **800 V for 480Y/277 or 400 V for 208Y/120.**
2. Line to Ground: **800 V for 480Y/277 or 400 V for 208Y/120**
3. Neutral to Ground: **800 V for 480Y/277 or 400 V for 208Y/120.**

2.3 DISCONNECTING AND OVERCURRENT PROTECTIVE DEVICES

A. Circuit Breaker: Comply with UL 489, with interrupting capacity to meet available fault currents and to be rated no less than 10,000 amps bracing. All circuit breakers shall be molded case bolt on type unless noted otherwise.

3. Electronic trip circuit breakers with rms sensing; field-replaceable rating plug or field-replicable electronic trip; and the following field-adjustable settings:
a. Instantaneous trip.
b. Long- and short-time pickup levels.
c. Long- and short-time time adjustments.
d. Ground-fault pickup level, time delay, and \( I^2 t \) response.

4. Molded-Case Circuit-Breaker (MCCB) Features and Accessories:
   a. Standard frame sizes, trip ratings, and number of poles.
   b. Lugs: Suitable for number, size, trip ratings, and conductor material.

B. Fuses are specified in Division 16 Section "Fuses."

2.4 IDENTIFICATION

A. Service Equipment Label: NRTL labeled for use as service equipment for switchboards with one or more service disconnecting and over current protective devices.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Equipment Mounting: Install switchboards on a concrete base, 2-inch in nominal thickness not to exceed 1" in equipment footprint. Coordinate utility meter height requirements utilizing pad dimensions with utility prior to switchgear release to ensure height complies with utility max height requirements.

1. Place and secure anchorage devices. Use setting drawings, templates, diagrams, instructions, and directions furnished with items to be embedded per manufacturer’s instructions.

2. Install anchor bolts to elevations required for proper attachment to switchboards per manufacturer’s instructions.

B. Install filler plates in unused spaces of panel-mounted sections.

C. Install over current protective devices, transient voltage suppression devices, and instrumentation.

1. Set field-adjustable switches and circuit-breaker trip ranges.

2. Clean gear at completion of the job and touch up any damaged painting.

3.2 IDENTIFICATION

A. Identify field-installed conductors, interconnecting wiring, and components; provide warning signs complying with requirements for identification specified in Division 26 Section "Identification for Electrical Systems."

B. Switchboard Nameplates: Label each switchboard compartment with a nameplate complying with requirements for identification specified in Division 16 Section "Identification for Electrical Systems."
C. Device Nameplates: Label each disconnecting and over current protective device and each meter and control device mounted in compartment doors with a nameplate complying with requirements for identification specified in Division 16 Section "Identification for Electrical Systems."

3.3 FIELD QUALITY CONTROL

A. Acceptance Testing Preparation:

1. Test insulation resistance for each switchboard bus, component, connecting supply, feeder, and control circuit.
2. Test continuity of each circuit.

B. Tests and Inspections:

1. Perform each visual and mechanical inspection and electrical test stated in NETA Acceptance Testing Specification. Certify compliance with test parameters.
2. Correct malfunctioning units on-site, where possible, and retest to demonstrate compliance; otherwise, replace with new units and retest.
3. Test and adjust controls, remote monitoring, and safeguards. Replace damaged and malfunctioning controls and equipment.

C. Switchboard will be considered defective if it does not pass tests and inspections.

D. Prepare test and inspection reports, including a certified report that identifies switchboards included and that describes scanning results. Include notation of deficiencies detected, remedial action taken, and observations after remedial action.

END OF SECTION
SECTION 16416
PANELBOARDS

PART 1 - GENERAL

1.1 SUMMARY
A. Section includes distribution panelboards and lighting and appliance branch-circuit panelboards.

1.2 SUBMITTALS
A. Product Data: For each type of product indicated.
B. Shop Drawings: For each panelboard and related equipment.
   1. Include dimensioned plans, elevations, sections, and details. Show tabulations of installed devices, equipment features, and ratings.
   2. Detail enclosure types
   3. Detail bus configuration, current, and voltage ratings.
   4. Short-circuit current rating of panelboards and overcurrent protective devices.
C. Typewritten panelboard schedules for installation in panelboards.
D. Operation and maintenance data.

1.3 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. Comply with NEMA PB 1.
C. Comply with NFPA 70.

1.4 WARRANTY
A. Special Warranty: Manufacturer’s standard form in which manufacturer agrees to repair or replace transient voltage suppression devices that fail in materials or workmanship within specified warranty period.
   1. Warranty Period: One year from date of Substantial Completion.
PART 2 - PRODUCTS

2.1 GENERAL REQUIREMENTS FOR PANELBOARDS

A. Fabricate and test panel boards according to IEEE 344 to withstand seismic forces defined in Division 26 Section "Vibration and Seismic Controls for Electrical Systems."

B. Enclosures:
   1. Dead Front: Secured to box with concealed hinges. For surface-mounted fronts, match box dimensions; for flush-mounted fronts, overlap box.
   2. Hinged Front Cover: Entire front trim hinged to box and with standard door within hinged trim cover.

C. Phase, Neutral, and Ground Buses: Hard-drawn copper.

D. Conductor Connectors: Suitable for use with conductor material and sizes.

E. Future Devices: Mounting brackets, bus connections, filler plates, and necessary appurtenances required for future installation of devices.


2.2 DISTRIBUTION PANELBOARDS

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
   1. Eaton Electrical Inc.; Cutler-Hammer Business Unit.
   4. Square D; a brand of Schneider Electric.

B. Doors: Secured with vault-type latch with tumbler lock; keyed alike.

C. Mains: Circuit breaker.

D. Branch Over current Protective Devices: For all Circuit-Breaker Frame Sizes provide Bolt-on circuit breakers.

2.3 LIGHTING AND APPLIANCE BRANCH-CIRCUIT PANELBOARDS

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
   1. Eaton Electrical Inc.; Cutler-Hammer Business Unit.
4. Square D; a brand of Schneider Electric.

B. Panelboards: NEMA PB 1, lighting and appliance branch-circuit type.

C. Branch Overcurrent Protective Devices: **Bolt-on** circuit breakers, replaceable without disturbing adjacent units.

D. Doors: Concealed hinges; secured with flush latch with tumbler lock; keyed alike.

2.4 DISCONNECTING AND OVERCURRENT PROTECTIVE DEVICES

A. Molded-Case Circuit Breaker (MCCB): Comply with UL 489, with **interrupting capacity** to meet available fault currents.

3. Electronic trip circuit breakers with rms sensing; field-replaceable rating plug or field-replicable electronic trip; and the following field-adjustable settings:
   a. Instantaneous trip.
   b. Long- and short-time pickup levels.
   c. Long- and short-time time adjustments.
   d. Ground-fault pickup level, time delay, and \( I^2t \) response.

4. Current-Limiting Circuit Breakers: Frame sizes 400 A and smaller; let-through ratings less than NEMA FU 1, RK-5.
5. GFCI Circuit Breakers: Single- and two-pole configurations with Class A ground-fault protection (5-mA trip).
   a. Provide GFCI type breakers as indicated on drawings and when required by code.
7. Molded-Case Circuit-Breaker (MCCB) Features and Accessories:
   a. Standard frame sizes, trip ratings, and number of poles.
   b. Lugs: suitable for number, size, trip ratings, and conductor materials rated for a minimum 75 degrees C.
   c. Application Listing: Appropriate for application; Type SWD for switching fluorescent lighting loads; Type HID for feeding fluorescent and high-intensity discharge (HID) lighting circuits.
   d. Ground-Fault Protection: **Integrally mounted** relay and trip unit with adjustable pickup and time-delay settings, push-to-test feature, and ground-fault indicator.

B. Fused Switch: NEMA KS 1, Type HD; clips to accommodate specified fuses; lockable handle.

1. Fuses, and Spare-Fuse Cabinet: Comply with requirements specified in Division 16 Section "Fuses."
PART 3 - EXECUTION

3.1 INSTALLATION

A. Receive, inspect, handle, store and install panelboards and accessories according to NEMA PB 1.1.

B. Comply with mounting and anchoring requirements specified in Division 16 Section "Vibration and Seismic Controls for Electrical Systems."

C. Mount top of trim 6’-7” above finished floor per NEC article 240.24 unless otherwise indicated.

D. Mount panelboard cabinet plumb and rigid without distortion of box. Mount recessed panelboards with fronts uniformly flush with wall finish and mating with back box.

E. Install overcurrent protective devices and controllers not already factory installed.
   1. Set field-adjustable, circuit-breaker trip ranges.

F. Install filler plates in unused spaces.

G. Stub two 1-inch (27-GRC) empty conduits from panelboard into accessible ceiling space or space designated to be ceiling space in the future. Stub four 1-inch (27-GRC) empty conduits into raised floor space or below slab not on grade.

H. Each branch circuit with-in the panelboard enclosure shall be permanent label with the circuit number and the conductors shall be trained in a workmen like manner.

I. Comply with NECA 1.

3.2 IDENTIFICATION

A. Identify field-installed conductors, interconnecting wiring, and components; provide warning signs complying with Division 16 Section "Identification for Electrical Systems."

B. Create a directory to indicate installed circuit loads and incorporating Owner's final room designations. Obtain approval before installing. Use a computer or typewriter to create directory; handwritten directories are not acceptable.

C. Panelboard Nameplates: Label each panelboard with a nameplate complying with requirements for identification specified in Division 16 Section "Identification for Electrical Systems."

D. Device Nameplates: Label each branch circuit device in distribution panelboards with a nameplate complying with requirements for identification specified in Division 16 Section "Identification for Electrical Systems."

3.3 FIELD QUALITY CONTROL

A. Perform tests and inspections.

B. Acceptance Testing Preparation:
1. Test insulation resistance for each panelboard bus, component, connecting supply, feeder, and control circuit.
2. Test continuity of each circuit.

C. Tests and Inspections:

1. Perform each visual and mechanical inspection and electrical test stated in NETA Acceptance Testing Specification. Certify compliance with test parameters.
2. Correct malfunctioning units on-site, where possible, and retest to demonstrate compliance; otherwise, replace with new units and retest.

D. Panelboards will be considered defective if they do not pass tests and inspections.

E. Prepare test and inspection reports, including a certified report that identifies panelboards included and that describes scanning results. Include notation of deficiencies detected, remedial action taken and observations after remedial action.

END OF SECTION 16416
SECTION 16418
FUSES

PART 1 - GENERAL

1.1 SUMMARY
A. Section Includes: Cartridge fuses rated 600-V ac and less for use in enclosed switches, switchboards, motor-control centers.

1.2 SUBMITTALS
A. Product Data: For each type of product indicated.
B. Operation and maintenance data.

1.3 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. Comply with NEMA FU 1 for cartridge fuses.
C. Comply with NFPA 70.

PART 2 - PRODUCTS

2.1 MANUFACTURERS
A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
   1. Cooper Bussmann, Inc.
   2. Edison Fuse, Inc.
   3. Ferraz Shawmut, Inc.
   4. Littelfuse, Inc.

2.2 CARTRIDGE FUSES
A. Characteristics: NEMA FU 1, nonrenewable cartridge fuses with voltage ratings consistent with circuit voltages.
PART 3 - EXECUTION

3.1 FUSE APPLICATIONS

A. Service Entrance:  Per coordination study, see section 16573.
B. Feeders:  Per coordination study, see section 16573.
C. Motor Branch Circuits: Class RK5, time delay.
D. Other Branch Circuits: Class RK1, time delay, Class J, fast acting.

3.2 INSTALLATION

A. Install fuses in fusible devices. Arrange fuses so rating information is readable without removing fuse.

3.3 IDENTIFICATION

A. Install labels complying with requirements for identification specified in Division 16 Section "Identification for Electrical Systems" and indicating fuse replacement information on inside door of each fused switch and adjacent to each fuse block and holder.

END OF SECTION
SECTION 16519
LOW-VOLTAGE ELECTRICAL POWER CONDUCTORS AND CABLES

PART 1 - GENERAL

1.1 SUMMARY
A. This Section includes the following:
   1. Building and Exterior wires and cables rated 600 V and less.
   2. Connectors, splices, and terminations rated 600 V and less.

1.2 ACTION SUBMITTALS
A. Product Data: For each type of product indicated.

1.3 INFORMATIONAL SUBMITTALS
A. Field quality-control test reports.

1.4 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. Comply with NFPA 70.

PART 2 - PRODUCTS

2.1 CONDUCTORS AND CABLES
A. Copper Conductors: Comply with NEMA WC 70.
   B. Conductor Insulation: Comply with NEMA WC 70 for specified types herein.
   C. Multiconductor Cable: Not allowed.

2.2 CONNECTORS AND SPLICES
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. AFC Cable Systems, Inc.
3. O-Z/Gedney; EGS Electrical Group LLC.
4. 3M; Electrical Products Division.
5. Tyco Electronics Corp.
6. Or equal.

C. Description: Factory-fabricated connectors and splices of size, ampacity rating, material, type, and class for application and service indicated.

D. All cables shall arrive on the job site in un-broken packages.

PART 3 - EXECUTION

3.1 CONDUCTOR MATERIAL APPLICATIONS

A. Copper conductors: Solid for No. 10 AWG and smaller; stranded for No. 8 AWG and larger.

3.2 CONDUCTOR INSULATION AND MULTICONDUCTOR CABLE APPLICATIONS AND WIRING METHODS

A. Insulation: Thermoplastic type THWN or THHN. Use conductors with 150 degrees C insulation in abnormally high ambient temperatures as applicable. Type THHN may be used in dry locations.

3.3 INSTALLATION OF CONDUCTORS AND CABLES

A. All conductors are to be installed in conduit/raceways.
B. Conceal cables in finished walls, ceilings, and floors, unless otherwise indicated.
C. Use manufacturer-approved pulling compound or lubricant where necessary; compound used must not deteriorate conductor or insulation. Do not exceed manufacturer's recommended maximum pulling tensions and sidewall pressure values.
D. Use pulling means, including fish tape, cable, rope, and basket-weave wire/cable grips, that will not damage cables or raceway.
E. Install exposed cables parallel and perpendicular to surfaces of exposed structural members, and follow surface contours where possible.
F. Identify and color-code conductors and cables according to Division 16 Section "Identification for Electrical Systems."
G. Tighten electrical connectors and terminals according to manufacturer's published torque-tightening values. If manufacturer's torque values are not indicated, use those specified in UL 486A and UL 486B.
H. Make splices and taps that are compatible with conductor material and that possess equivalent or better mechanical strength and insulation ratings than unspliced conductors.

1. Use oxide inhibitor in each splice and tap conductor for aluminum conductors.

3.4 SLEEVE AND SLEEVE-SEAL INSTALLATION FOR ELECTRICAL PENETRATIONS & FIRESTOPPING

A. Provide sleeves for conduits passing through poured concrete walls and concrete or concrete fireproofed steel beams. Provide 18 gauge galvanized steel and place in correct position in forms before concrete is poured. Sleeve shall be at least ½” above finished floor all around. Pack void between sleeve and conduit as follows:

1. Where conduit is run between floors in a fireproof shaft, pack with Duxseal
2. Where conduit penetrates a fire separation, any of the following packing methods may be used to restore integrity of the separation if code approved: cement, mineral fiber sprayed with flame retardant coating or Dow Corning 3—6548 RTV silicon foam, 3M caulk #CP25, 3M putty #303 or equal. Seal shall be water tight and shall be accomplished prior to wire pulling.

3.5 FIELD QUALITY CONTROL

A. Perform tests and inspections and prepare test reports.

B. Tests and Inspections:

1. After installing conductors and cables and before electrical circuitry has been energized, test for compliance with requirements.

C. Test Reports: Prepare a written report to record the following:

1. Test procedures used.
2. Test results that comply with requirements.
3. Test results that do not comply with requirements and corrective action taken to achieve compliance with requirements.

D. Remove and replace malfunctioning units and retest as specified above.

END OF SECTION
SECTION 16526
GROUNDING AND BONDING FOR ELECTRICAL SYSTEMS

PART 1 - GENERAL

1.1 SUMMARY
A. Section Includes: Grounding systems and equipment.

1.2 SUBMITTALS
A. Product Data: For each type of product indicated.
B. Field quality-control reports.

1.3 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. Comply with UL 467 for grounding and bonding materials and equipment.

PART 2 - PRODUCTS

2.1 CONDUCTORS
A. Insulated Conductors: Copper only wire or cable insulated for 600 V unless otherwise required by applicable Code or authorities having jurisdiction.
B. Bare Copper Conductors:

2.2 CONNECTORS
A. Listed and labeled by an NRTL acceptable to authorities having jurisdiction for applications in which used and for specific types, sizes, and combinations of conductors and other items connected.
B. Bolted Connectors for Conductors and Pipes: Copper or copper alloy, pressure type with at least two bolts.
   1. Pipe Connectors: Compression type, sized for pipe.
C. Welded Connectors: Exothermic-welding kits of types recommended by kit manufacturer for materials being joined and installation conditions.

2.3 GROUNDING ELECTRODES

A. Ground Rods: **Copper 3/4 inch in diameter by 10 feet long minimum.**

PART 3 - EXECUTION

3.1 APPLICATIONS

A. Conductors: Install solid conductor for No. 8 AWG and smaller, and stranded conductors for No. 6 AWG and larger unless otherwise indicated.

B. Isolated Grounding Conductors: Green-colored insulation with continuous yellow stripe. On feeders with isolated ground, identify grounding conductor where visible to normal inspection, with alternating bands of green and yellow tape, with at least three bands of green and two bands of yellow.

C. Conductor Terminations and Connections:
   1. Welded connectors
   2. Bolted connectors

3.2 EQUIPMENT GROUNDING

A. Install insulated equipment grounding conductors in all circuit runs, in addition to those required by NFPA 70

B. Air-Duct Equipment Circuits: Install insulated equipment grounding conductor to duct-mounted electrical devices operating at 120 V and more, including air cleaners, heaters, dampers, humidifiers, and other duct electrical equipment. Bond conductor to each unit and to air duct and connected metallic piping.

C. Water Heater, Heat-Tracing, and Antifrost Heating Cables: Install a separate insulated equipment grounding conductor to each electric water heater and heat-tracing cable. Bond conductor to heater units, piping, connected equipment, and components.

D. Signal and Communication Equipment: In addition to grounding and bonding required by NFPA 70, provide a separate grounding system complying with requirements in TIA/ATIS J-STD-607-A.
   1. For telephone, alarm, voice and data, and other communication equipment, provide No. 4 AWG unless otherwise noted insulated grounding conductor in raceway from grounding electrode system to each service location, terminal cabinet, wiring closet, and central equipment location.
   2. Service and Central Equipment Locations and Wiring Closets: Terminate grounding conductor on a 1/4-by-4-by-12-inch grounding bus.
   3. Terminal Cabinets: Terminate grounding conductor on cabinet grounding terminal.
E. **Metal** Poles Supporting Outdoor Lighting Fixtures: Install grounding electrode and a separate insulated equipment grounding conductor in addition to grounding conductor installed with branch-circuit conductors.

3.3 INSTALLATION

A. **Grounding Conductors:** Route along shortest and straightest paths possible unless otherwise indicated or required by Code. Avoid obstructing access or placing conductors where they may be subjected to strain, impact, or damage.

B. **Ground Rods:** Drive rods until tops are **2 inches** below finished floor or final grade unless otherwise indicated.

   1. Interconnect ground rods with grounding electrode conductor below grade and as otherwise indicated. Make connections without exposing steel or damaging coating if any.

C. **Test Wells:** Ground rod driven through drilled hole in bottom of handhole. Handholes are specified in Division 26 Section "Underground Ducts and Raceways for Electrical Systems," and shall be at least **12 inches** deep, with cover.

   1. Test Wells: Install at least one test well for each service unless otherwise indicated. Install at the ground rod electrically closest to service entrance. Set top of test well flush with finished grade or floor.

D. **Bonding Straps and Jumpers:** Install in locations accessible for inspection and maintenance except where routed through short lengths of conduit.

   1. **Bonding to Structure:** Bond straps directly to basic structure, taking care not to penetrate any adjacent parts.
   2. **Bonding to Equipment Mounted on Vibration Isolation Hangers and Supports:** Install bonding so vibration is not transmitted to rigidly mounted equipment.
   3. Use exothermic-welded connectors for outdoor locations; if a disconnect-type connection is required, use a bolted clamp.

E. **Grounding and Bonding for Piping:**

   1. **Metal Water Service Pipe:** Install insulated copper grounding conductors, in conduit, from building's main service equipment, or grounding bus, to main metal water service entrances to building. Connect grounding conductors to main metal water service pipes; use a bolted clamp connector or bolt a lug-type connector to a pipe flange using one of the lug bolts of the flange. Where a dielectric main water fitting is installed, connect grounding conductor on street side of fitting. Bond metal grounding conductor conduit or sleeve to conductor at each end.
   2. **Water Meter Piping:** Use braided-type bonding jumpers to electrically bypass water meters. Connect to pipe with a bolted connector.
   3. Bond each aboveground portion of gas piping system downstream from equipment shutoff valve.

F. **Bonding Interior Metal Ducts:** Bond metal air ducts to equipment grounding conductors of associated fans, blowers, electric heaters, and air cleaners. Install bonding jumper to bond across flexible duct connections to achieve continuity.
3.4 LABELING

A. Comply with requirements in Division 16 Section "Identification for Electrical Systems" Article for instruction signs. The label or its text shall be green.

B. Install labels at the telecommunications bonding conductor and grounding equalizer and at the grounding electrode conductor where exposed.

3.5 FIELD QUALITY CONTROL

A. Perform the following tests and inspections and prepare test reports:

1. After installing grounding system but before permanent electrical circuits have been energized, test for compliance with requirements.
2. Inspect physical and mechanical condition. Verify tightness of accessible, bolted, electrical connections with a calibrated torque wrench according to manufacturer's written instructions.
3. Test completed grounding system at each location where a maximum ground-resistance level is specified, at service disconnect enclosure grounding terminal, and at ground test wells. Make tests at ground rods before any conductors are connected.

B. Report measured ground resistances that exceed the following values:

1. Power and Lighting Equipment or System with Capacity of 500 kVA and Less: 10 ohms.
2. Power and Lighting Equipment or System with Capacity of 500 to 1000 kVA: 5 ohms.
3. Power and Lighting Equipment or System with Capacity More Than 1000 kVA: 3 ohms.
4. Power Distribution Units or Panelboards Serving Electronic Equipment: 1 ohm(s).

C. Excessive Ground Resistance: If resistance to ground exceeds specified values, notify electrical engineer of record promptly. Provide at notification alternate method of reducing ground resistance below the above noted compliant values.

END OF SECTION
SECTION 16533
RACEWAYS AND BOXES FOR ELECTRICAL SYSTEMS

PART 1 - GENERAL

1.1 SUMMARY
   A. This Section includes raceways, fittings, boxes, enclosures, and cabinets for electrical wiring.
   B. See Division 26 Section "Underground Ducts and Raceways for Electrical Systems" for exterior ductbanks and manholes, and underground handholes, boxes, and utility construction.

1.2 SUBMITTALS
   A. Product Data: For surface raceways, wireways and fittings, floor boxes, hinged-cover enclosures, and cabinets.
   B. Shop Drawings: For custom enclosures and cabinets. Include plans, elevations, sections, details, and attachments to other work.

1.3 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. Comply with NFPA 70.

PART 2 - PRODUCTS

2.1 METAL CONDUIT AND TUBING
   A. Rigid Steel Conduit: ANSI C80.1.
   B. IMC: ANSI C80.6.
   C. EMT: ANSI C80.3.
   D. FMC: Zinc-coated steel.
   E. LFMC: Flexible steel conduit with PVC jacket.
   F. Fittings for Conduit (Including all Types and Flexible and Liquid tight), EMT, and Cable: NEMA FB 1; listed for type and size raceway with which used, and for application and environment in which installed.
2. Fittings for EMT: compression type.

2.2 NONMETALLIC CONDUIT AND TUBING

B. RNC: NEMA TC 2, Type EPC-40-PVC, unless otherwise indicated.
C. LFNC: UL 1660.
D. Fittings for ENT and RNC: NEMA TC 3; match to conduit or tubing type and material.
E. Fittings for LFNC: UL 514B.

2.3 METAL WIREWAYS

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:
   1. Cooper B-Line, Inc.
   2. Hoffman.
   3. Square D; Schneider Electric.
   4. Or equal
B. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
   1. Cooper B-Line, Inc.
   2. Hoffman.
   3. Square D; Schneider Electric.
   4. Or equal
C. Description: Sheet metal sized and shaped as indicated, NEMA 250, Type 1, 12 or 3R, as indicated.
D. Fittings and Accessories: Include couplings, offsets, elbows, expansion joints, adapters, hold-down straps, end caps, and other fittings to match and mate with wireways as required for complete system.
E. Wireway Covers: As indicated.
F. Finish: Manufacturer's standard enamel finish.

2.4 NONMETALLIC WIREWAYS

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. Hoffman.
   2. Lamson & Sessions; Carlon Electrical Products.
   3. Or equal
C. Description: PVC plastic, extruded and fabricated to size and shape indicated, with snap-on cover and mechanically coupled connections with plastic fasteners.
D. Fittings and Accessories: Include couplings, offsets, elbows, expansion joints, adapters, hold-down straps, end caps, and other fittings to match and mate with wireways as required for complete system.

2.5 SURFACE RACEWAYS

A. Surface Metal Raceways: Galvanized steel. Manufacturer's standard enamel finish or in color selected by Architect per drawings.

1. 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:
   a. Thomas & Betts Corporation.
   c. Wiremold Company (The); Electrical Sales Division.
   d. Or equal.

B. Surface Nonmetallic Raceways: Two-piece construction, manufactured of rigid PVC with texture and color selected by Architect.

1. 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:
   a. Butler Manufacturing Company; Walker Division.
   b. Enduro Systems, Inc.; Composite Products Division.
   c. Hubbell Incorporated; Wiring Device-Kellems Division.
   d. Lamson & Sessions; Carlon Electrical Products.
   e. Panduit Corp.
   g. Wiremold Company (The); Electrical Sales Division.
   h. Or equal.

2.6 BOXES, ENCLOSURES, AND CABINETS

A. Sheet Metal Outlet and Device Boxes: NEMA OS 1.

B. Cast-Metal Outlet and Device Boxes: NEMA FB 1, ferrous alloy, Type FD, with gasketed cover.

C. Nonmetallic Outlet and Device Boxes: NEMA OS 2.

D. Metal Floor Boxes: Cast metal, fully adjustable.

E. Nonmetallic Floor Boxes: Nonadjustable, round.

F. Small Sheet Metal Pull and Junction Boxes: NEMA OS 1.

G. Cast-Metal Access, Pull, and Junction Boxes: NEMA FB 1, cast aluminum with gasketed cover.

H. Hinged-Cover Enclosures: NEMA 250, Type 1, with continuous-hinge cover with flush latch, unless otherwise indicated.

1. Metal Enclosures: Steel, finished inside and out with manufacturer's standard enamel.
2. Nonmetallic Enclosures: PVC.

I. Cabinets:

1. NEMA 250, Type 1, galvanized-steel box with removable interior panel and removable front, finished inside and out with manufacturer's standard enamel.
2. Hinged door in front cover with flush latch and concealed hinge.
3. Key latch to match panelboards.
4. Metal barriers to separate wiring of different systems and voltage.
5. Accessory feet where required for freestanding equipment.

PART 3 - EXECUTION

3.1 RACEWAY APPLICATION

A. Outdoors: Apply raceway products as specified below, unless otherwise indicated:

1. Exposed Conduit: Rigid steel conduit, EMT, RNC, Type EPC-40-PVC, RNC, Type EPC-80-PVC.
2. Concealed Conduit, Aboveground: Rigid steel conduit, EMT, RNC.
3. Underground Conduit: Type EPC-40 or 80-PVC, direct buried.
4. Connection to Vibrating Equipment (Including Transformers and Hydraulic, Pneumatic, Electric Solenoid, or Motor-Driven Equipment): LFMC or LFNC.
5. Boxes and Enclosures, Aboveground: NEMA 250, Type 3R or 4X as noted.

B. Comply with the following indoor applications, unless otherwise indicated:

1. Exposed, Not Subject to Physical Damage: EMT or rigid steel conduit.
2. Exposed and Subject to Severe Physical Damage: Rigid steel conduit. Includes raceways in the following locations:
   a. Loading dock.
   b. Corridors used for traffic of mechanized carts, forklifts, and pallet-handling units.
   c. Mechanical rooms.
3. Concealed in Ceilings and Interior Walls and Partitions: EMT.
4. Connection to Vibrating Equipment (Including Transformers and Hydraulic, Pneumatic, Electric Solenoid, or Motor-Driven Equipment): FMC, except use LFMC in damp or wet locations.
5. Damp or Wet Locations: Rigid steel conduit.
6. Raceways for Optical Fiber or Communications Cable: EMT.
7. Boxes and Enclosures: NEMA 250, Type 1, except use NEMA 250, Type 4X in damp or wet locations.

C. Minimum Raceway Size: 1/2-inch trade size.

D. Raceway Fittings: Compatible with raceways and suitable for use and location.

1. Rigid and Intermediate Steel Conduit: Use threaded rigid steel conduit fittings, unless otherwise indicated.
3.2 INSTALLATION

A. Conduit passing through roof: flash and counter flash. Method shall be compatible with roofing system and acceptable to the owner’s representative.

B. Comply with NECA 1 for installation requirements applicable to products specified in Part 2 except where requirements on Drawings or in this Article are stricter.

C. Keep raceways at least 6 inches away from parallel runs of flues and steam or hot-water pipes. Install horizontal raceway runs above water and steam piping.

D. Complete raceway installation before starting conductor installation.

E. Arrange stub-ups so curved portions of bends are not visible above the finished slab.

F. Install no more than the equivalent of three 90-degree bends in any conduit run except for communications conduits, for which fewer bends are allowed.

G. Conceal conduit and EMT within finished walls, ceilings, and floors, unless otherwise indicated.
   1. Conduit shall not be imbedded in slabs on grade.

H. Raceway Terminations at Locations Subject to Moisture or Vibration: Use insulating sealing bushings to protect conductors, including conductors smaller than No. 4 AWG.

I. All conduit stubs shall have insulated bushings.

J. Install pull wires in empty raceways. Use polypropylene or monofilament plastic line with not less than 200-lb tensile strength. Leave at least 12 inches of slack at each end of pull rope.

K. Raceways for Optical Fiber and Communications Cable: Install as follows:
   1. 3/4-Inch Trade Size: Install raceways in maximum lengths of 50 feet.
   2. 1-Inch Trade Size and Larger: Install raceways in maximum lengths of 75 feet.
   3. Install with a maximum of two 90-degree bends or equivalent for each length of raceway unless Drawings show stricter requirements. Separate lengths with pull or junction boxes or terminations at distribution frames or cabinets where necessary to comply with these requirements.

L. Install raceway sealing fittings at suitable, approved, and accessible locations and fill them with listed sealing compound. For concealed raceways, install each fitting in a flush steel box with a blank cover plate having a finish similar to that of adjacent plates or surfaces. Install raceway sealing fittings at the following points:
   1. Where conduits pass from warm to cold locations, such as boundaries of refrigerated spaces.
   2. Where otherwise required by NFPA 70.

M. Expansion-Joint Fittings for RNC: Install in each run of aboveground conduit that is located where environmental temperature change may exceed 30 deg F, and that has straight-run length that exceeds 25 feet.
   1. Install expansion-joint fittings for each of the following locations, and provide type and quantity of fittings that accommodate temperature change listed for location:
      a. Outdoor Locations Not Exposed to Direct Sunlight: 125 deg F temperature change.
b. Outdoor Locations Exposed to Direct Sunlight: 155 deg F temperature change.
c. Indoor Spaces Connected with the Outdoors without Physical Separation: 125 deg F temperature change.
d. Attics: 135 deg F temperature change.

2. Install fitting(s) that provide expansion and contraction for at least 0.00041 inch per foot of length of straight run per deg F of temperature change.

3. Install each expansion-joint fitting with position, mounting, and piston setting selected according to manufacturer's written instructions for conditions at specific location at the time of installation.

N. Flexible Conduit Connections: Use maximum of 72 inches of flexible conduit for recessed and semirecessed lighting fixtures, equipment subject to vibration, noise transmission, or movement; and for transformers and motors.

1. Use LFMC in damp or wet locations subject to severe physical damage.
2. Use LFMC or LFNC in damp or wet locations not subject to severe physical damage.

O. Recessed Boxes in Masonry Walls: Saw-cut opening for box in center of cell of masonry block, and install box flush with surface of wall.

P. Set metal floor boxes level and flush with finished floor surface.

Q. Set nonmetallic floor boxes level. Trim after installation to fit flush with finished floor surface.

3.3 INSTALLATION OF UNDERGROUND CONDUIT

A. Direct-Buried Conduit:

1. Excavate trench bottom to provide firm and uniform support for conduit. Prepare trench bottom as specified in Division 31 Section "Earth Moving" for pipe less than 6 inches in nominal diameter.
2. Install backfill as specified in Division 31 Section "Earth Moving."
3. After installing conduit, backfill and compact. Start at tie-in point, and work toward end of conduit run, leaving conduit at end of run free to move with expansion and contraction as temperature changes during this process. Firmly hand tamp backfill around conduit to provide maximum supporting strength. After placing controlled backfill to within 12 inches of finished grade, make final conduit connection at end of run and complete backfilling with normal compaction as specified in Division 31 Section "Earth Moving."
4. Install manufactured duct elbows for stub-ups at poles and equipment and at building entrances through the floor, unless otherwise indicated. Encase elbows for stub-up ducts throughout the length of the elbow.
5. Install manufactured rigid steel conduit elbows for stub-ups at poles and equipment and at building entrances through the floor.

a. Couple steel conduits to ducts with adapters designed for this purpose, and encase coupling with 3 inches of concrete.
b. For stub-ups at equipment mounted on outdoor concrete bases, extend steel conduit horizontally a minimum of 60 inches from edge of equipment pad or foundation. Install insulated grounding bushings on terminations at equipment.

6. Warning Planks: Bury warning tape approximately 12 inches above direct-buried conduits, placing them 24 inches o.c. Align tape along the width and along the centerline of conduit.
B. Bury underground conduit (except under building) to a 24” minimum depth below finished grade to top of conduit or concrete envelope (when encased) except that for conduit below a road or driveway to dimension shall me a 30” minimum.

1. All conduit risers from below grade shall be PVC schedule 80 with the exception of risers to lighting pole may be PVC schedule 40.

3.4 FIRESTOPPING

A. Apply firestopping to electrical penetrations of fire-rated floor and wall assemblies to restore original fire-resistance rating of assembly.

END OF SECTION
SECTION 16548

VIBRATION AND SEISMIC CONTROLS FOR ELECTRICAL SYSTEMS

PART 1 - GENERAL

1.1 SUMMARY

A. Section includes:
   1. Isolation pads.
   2. Spring isolators.
   3. Restrained spring isolators.
   4. Channel support systems.
   5. Restraint cables.
   6. Hanger rod stiffeners.
   7. Anchorage bushings and washers.

1.2 QUALITY ASSURANCE

A. Comply with seismic-restraint requirements in the IBC unless requirements in this Section are more stringent.

B. Welding Qualifications: Qualify procedures and personnel according to AWS D1.1/D1.1M, "Structural Welding Code - Steel."

C. 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 not available, 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.

D. Comply with NFPA 70.

PART 2 - PRODUCTS

2.1 VIBRATION ISOLATORS

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:

   1. Ace Mountings Co., Inc.
   2. Amber/Booth Company, Inc.
   4. Isolation Technology, Inc.
7. Vibration Eliminator Co., Inc.
8. Vibration Isolation.
10. Or equal

B. Pads: Arrange in single or multiple layers of sufficient stiffness for uniform loading over pad area, molded with a nonslip pattern and galvanized-steel baseplates, and factory cut to sizes that match requirements of supported equipment.

1. Resilient Material: Oil- and water-resistant rubber.

C. Spring Isolators: Freestanding, laterally stable, open-spring isolators.

1. Outside Spring Diameter: Not less than 80 percent of the compressed height of the spring at rated load.
2. Minimum Additional Travel: 50 percent of the required deflection at rated load.
3. Lateral Stiffness: More than 80 percent of rated vertical stiffness.
4. Overload Capacity: Support 200 percent of rated load, fully compressed, without deformation or failure.
5. Baseplates: Factory drilled for bolting to structure and bonded to 1/4-inch- (6-mm-) thick, rubber isolator pad attached to baseplate underside. Baseplates shall limit floor load to 500 psig (3447 kPa).
6. Top Plate and Adjustment Bolt: Threaded top plate with adjustment bolt and cap screw to fasten and level equipment.

D. Restrained Spring Isolators: Freestanding, steel, open-spring isolators with seismic or limit-stop restraint.

1. Housing: Steel with resilient vertical-limit stops to prevent spring extension due to weight being removed; factory-drilled baseplate bonded to 1/4-inch- (6-mm-) thick, neoprene or rubber isolator pad attached to baseplate underside; and adjustable equipment mounting and leveling bolt that acts as blocking during installation.
2. Restraint: Seismic or limit-stop as required for equipment and authorities having jurisdiction.
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.

2.2 SEISMIC-RESTRAINT DEVICES

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. Amber/Booth Company, Inc.
2. California Dynamics Corporation.
3. Cooper B-Line, Inc.; a division of Cooper Industries.
4. Hilti Inc.
C. General Requirements for Restraint Components: Rated strengths, features, and application requirements shall be as defined in reports by an agency acceptable to authorities having jurisdiction.

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.

D. Channel Support System: MFMA-3, shop- or field-fabricated support 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; and rated in tension, compression, and torsion forces.

E. Restraint Cables: ASTM A 492 stainless-steel cables with end connections made of steel assemblies with thimbles, brackets, swivels, and bolts designed for restraining cable service; and with a minimum of two clamping bolts for cable engagement.

F. Hanger Rod Stiffener: Steel tube or steel slotted-support-system sleeve with internally bolted connections to hanger rod. Do not weld stiffeners to rods.

G. Bushings for Floor-Mounted Equipment Anchor: Neoprene bushings designed for rigid equipment mountings, and matched to type and size of anchors and studs.

H. 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.

I. Resilient Isolation Washers and Bushings: One-piece, molded, oil- and water-resistant neoprene, with a flat washer face.

J. Mechanical Anchor: Drilled-in and stud-wedge or female-wedge type in zinc-coated steel for interior applications and stainless steel for exterior applications. Select anchors with strength required for anchor and as tested according to ASTM E 488. Minimum length of eight times diameter.

PART 3 - EXECUTION

3.1 APPLICATIONS

A. Multiple Raceways or Cables: Secure raceways and cables to trapeze member with clamps approved for application by 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 will be adequate to carry present and future static and seismic loads within specified loading limits.

3.2 SEISMIC-RESTRAINT DEVICE INSTALLATION

A. Equipment and Hanger Restraints:

1. Install restrained isolators on electrical equipment.
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 agency acceptable to authorities having jurisdiction providing required submittals for component.

B. 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.

C. 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.

D. 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.

3.3 ACCOMMODATION OF DIFFERENTIAL SEISMIC MOTION

A. Install flexible connections in runs of raceways, cables, wireways, cable trays, and busways where they cross seismic joints, where adjacent sections or branches are supported by different structural elements, and where they terminate with connection to equipment that is anchored to a different structural element from the one supporting them as they approach equipment.

3.4 FIELD QUALITY CONTROL

A. Tests and Inspections:
2. Test at least four of each type and size of installed anchors and fasteners selected by Architect.
3. Test to 90 percent of rated proof load of device.
4. Measure isolator restraint clearance.
5. Measure isolator deflection.
6. Verify snubber minimum clearances.
7. If a device fails test, modify all installations of same type and retest until satisfactory results are achieved.

B. Remove and replace malfunctioning units and retest as specified above.

C. Prepare test and inspection reports.

3.5 ADJUSTING

A. Adjust isolators after isolated equipment 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.

C. Adjust active height of spring isolators.

D. Adjust restraints to permit free movement of equipment within normal mode of operation.

END OF SECTION
PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Identification for raceways.
2. Identification of power and control cables.
3. Identification for conductors.
5. Warning labels and signs.
6. Instruction signs.
7. Equipment identification labels.
8. Miscellaneous identification products.

1.2 SUBMITTALS

A. Product Data: For each electrical identification product indicated.

1.3 QUALITY ASSURANCE

A. Comply with ANSI A13.1.
B. Comply with NFPA 70.
D. Comply with ANSI Z535.4 for safety signs and labels.
E. Adhesive-attached labeling materials, including label stocks, laminating adhesives, and inks used by label printers, shall comply with UL 969.

PART 2 - PRODUCTS

2.1 POWER RACEWAY IDENTIFICATION MATERIALS

A. Comply with ANSI A13.1 for minimum size of letters for legend and for minimum length of color field for each raceway size.

B. Colors for Raceways Carrying Circuits at 600 V or Less:

1. White letters on a black field.
2. Legend: Indicate voltage and system or service type.

C. Self-Adhesive Vinyl Labels for Raceways Carrying Circuits at 600 V or Less: Preprinted, flexible label laminated with a clear, weather- and chemical-resistant coating and matching wraparound adhesive tape for securing ends of legend label.

D. Snap-Around Labels for Raceways Carrying Circuits at 600 V or Less: Slit, pretensioned, flexible, preprinted, color-coded acrylic sleeve, with diameter sized to suit diameter of raceway or cable it identifies and to stay in place by gripping action.

E. Snap-Around, Color-Coding Bands for Raceways Carrying Circuits at 600 V or Less: Slit, pretensioned, flexible, solid-colored acrylic sleeve, 2 inches long, with diameter sized to suit diameter of raceway or cable it identifies and to stay in place by gripping action.

F. Write-On Tags: Polyester tag, 0.015 inch thick, with corrosion-resistant grommet and cable tie for attachment to conductor or cable.

1. Marker for Tags: Permanent, waterproof, black ink marker recommended by tag manufacturer.
2. Marker for Tags: Machine-printed, permanent, waterproof, black ink marker recommended by printer manufacturer.

2.2 POWER AND CONTROL CABLE IDENTIFICATION MATERIALS

A. Comply with ANSI A13.1 for minimum size of letters for legend and for minimum length of color field for each raceway and cable size.

B. Self-Adhesive Vinyl Labels: Preprinted, flexible label laminated with a clear, weather- and chemical-resistant coating and matching wraparound adhesive tape for securing ends of legend label.

C. Write-On Tags: Polyester tag, 0.015 inch thick, with corrosion-resistant grommet and cable tie for attachment to conductor or cable.

1. Marker for Tags: Permanent, waterproof, black ink marker recommended by tag manufacturer.
2. Marker for Tags: Machine-printed, permanent, waterproof, black ink marker recommended by printer manufacturer.

D. Snap-Around Labels: Slit, pretensioned, flexible, preprinted, color-coded acrylic sleeve, with diameter sized to suit diameter of raceway or cable it identifies and to stay in place by gripping action.

E. Snap-Around, Color-Coding Bands: Slit, pretensioned, flexible, solid-colored acrylic sleeve, 2 inches (50 mm) long, with diameter sized to suit diameter of raceway or cable it identifies and to stay in place by gripping action.

2.3 CONDUCTOR IDENTIFICATION MATERIALS

A. Color-Coding Conductor Tape: Colored, self-adhesive vinyl tape not less than 3 mils thick by 1 to 2 inches wide.

B. Self-Adhesive Vinyl Labels: Preprinted, flexible label laminated with a clear, weather- and chemical-resistant coating and matching wraparound adhesive tape for securing ends of legend label.
C. Marker Tapes: Vinyl or vinyl-cloth, self-adhesive wraparound type, with circuit identification legend machine printed by thermal transfer or equivalent process.

D. Write-On Tags: Polyester tag, 0.015 inch thick, with corrosion-resistant grommet and cable tie for attachment to conductor or cable.
1. Marker for Tags: Permanent, waterproof, black ink marker recommended by tag manufacturer.
2. Marker for Tags: Machine-printed, permanent, waterproof, black ink marker recommended by printer manufacturer.

2.4 FLOOR MARKING TAPE

A. 2-inch-wide, 5-mil pressure-sensitive vinyl tape, with black and white stripes and clear vinyl overlay.

2.5 UNDERGROUND-LINE WARNING TAPE

A. Tape:
1. Recommended by manufacturer for the method of installation and suitable to identify and locate underground electrical and communications utility lines.
2. Printing on tape shall be permanent and shall not be damaged by burial operations.
3. Tape material and ink shall be chemically inert, and not subject to degrading when exposed to acids, alkalis, and other destructive substances commonly found in soils.

B. Color and Printing:
1. Comply with ANSI Z535.1 through ANSI Z535.5.
2. Inscriptions for Red-Colored Tapes: ELECTRIC LINE, HIGH VOLTAGE.
3. Inscriptions for Orange-Colored Tapes: TELEPHONE CABLE, CATV CABLE, COMMUNICATIONS CABLE, OPTICAL FIBER CABLE.

C. Tag: Type I:
1. Pigmented polyolefin, bright-colored, continuous-printed on one side with the inscription of the utility, compounded for direct-burial service.
2. Thickness: 4 mils.
3. Weight: 18.5 lb/1000 sq. ft.
4. 3-Inch Tensile According to ASTM D 882: 30 lbf, and 2500 psi.

D. Tag: Type ID:
1. Detectable three-layer laminate, consisting of a printed pigmented polyolefin film, a solid aluminum-foil core, and a clear protective film that allows inspection of the continuity of the conductive core, bright-colored, [continuous-printed on one side with the inscription of the utility,] compounded for direct-burial service.
2. Overall Thickness: 5 mils.
3. Foil Core Thickness: 0.35 mil.
5. 3-Inch Tensile According to ASTM D 882: 70 lbf, and 4600 psi.
2.6 WARNING LABELS AND SIGNS


B. Self-Adhesive Warning Labels: Factory-printed, multicolor, pressure-sensitive adhesive labels, configured for display on front cover, door, or other access to equipment unless otherwise indicated.

C. Baked-Enamel Warning Signs:
   1. Preprinted aluminum signs, punched or drilled for fasteners, with colors, legend, and size required for application.
   2. 1/4-inch grommets in corners for mounting.
   3. Nominal size, 7 by 10 inches.

D. Metal-Backed, Butyrate Warning Signs:
   1. Weather-resistant, nonfading, preprinted, cellulose-acetate butyrate signs with 0.0396-inch galvanized-steel backing; and with colors, legend, and size required for application.
   2. 1/4-inch grommets in corners for mounting.
   3. Nominal size, 10 by 14 inches.

E. Warning label and sign shall include, but are not limited to, the following legends:
   1. Multiple Power Source Warning: "DANGER - ELECTRICAL SHOCK HAZARD - EQUIPMENT HAS MULTIPLE POWER SOURCES."
   2. Workspace Clearance Warning: "WARNING - OSHA REGULATION - AREA IN FRONT OF ELECTRICAL EQUIPMENT MUST BE KEPT CLEAR FOR 36 INCHES."

2.7 INSTRUCTION SIGNS

A. Engraved, laminated acrylic or melamine plastic, minimum 1/16 inch thick for signs up to 20 sq. inches and 1/8 inch thick for larger sizes.
   1. Engraved legend with White letters on black face.
   2. Punched or drilled for mechanical fasteners.
   3. Framed with mitered acrylic molding and arranged for attachment at applicable equipment.

B. Adhesive Film Label: Machine printed, in black, by thermal transfer or equivalent process. Minimum letter height shall be 3/8 inch.

C. Adhesive Film Label with Clear Protective Overlay: Machine printed, in black, by thermal transfer or equivalent process. Minimum letter height shall be 3/8 inch. Overlay shall provide a weatherproof and UV-resistant seal for label.

2.8 EQUIPMENT IDENTIFICATION LABELS

A. Adhesive Film Label with Clear Protective Overlay: Machine printed, in black, by thermal transfer or equivalent process. Minimum letter height shall be 3/8 inch. Overlay shall provide a weatherproof and UV-resistant seal for label.
2.9 MISCELLANEOUS IDENTIFICATION PRODUCTS

A. Paint: Comply with requirements in Division 09 painting Sections for paint materials and application requirements. Select paint system applicable for surface material and location (exterior or interior).

B. Fasteners for Labels and Signs: Self-tapping, stainless-steel screws or stainless-steel machine screws with nuts and flat and lock washers.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Location: Install identification materials and devices at locations for most convenient viewing without interference with operation and maintenance of equipment.

B. Apply identification devices to surfaces that require finish after completing finish work.

C. Self-Adhesive Identification Products: Clean surfaces before application, using materials and methods recommended by manufacturer of identification device.

D. Attach signs and plastic labels that are not self-adhesive type with mechanical fasteners appropriate to the location and substrate.

E. System Identification Color-Coding Bands for Raceways and Cables: Each color-coding band shall completely encircle cable or conduit. Place adjacent bands of two-color markings in contact, side by side. Locate bands at changes in direction, at penetrations of walls and floors, at 50-foot maximum intervals in straight runs, and at 25-foot maximum intervals in congested areas.

F. Underground-Line Warning Tape: During backfilling of trenches install continuous underground-line warning tape directly above line at 6 to 8 inches below finished grade. Use multiple tapes where width of multiple lines installed in a common trench [or concrete envelope] exceeds 16 inches overall.

G. Painted Identification: Comply with requirements in Division 09 painting Sections for surface preparation and paint application.

3.2 IDENTIFICATION SCHEDULE

A. Accessible Raceways and Metal-Clad Cables, 600 V or Less, for Service, Feeder, and Branch Circuits More Than 20A, and 120 V to ground: Install labels at 10-foot maximum intervals.

B. Accessible Raceways and Cables within Buildings: Identify the covers of each junction and pull box of the following systems with self-adhesive vinyl labels with the wiring system legend and system voltage. System legends shall be as follows:
2. Power.
3. UPS.

C. Power-Circuit Conductor Identification, 600 V or Less: For conductors in vaults, pull and junction boxes, manholes, and handholes, use color-coding conductor tape to identify the phase.

1. Color-Coding for Phase and Voltage Level Identification, 600 V or Less: Use colors listed below for ungrounded feeder and branch-circuit conductors.

   a. Color shall be factory applied.
   b. Colors for 208/120-V Circuits:
      1) Phase A: Black.
      2) Phase B: Red.
      3) Phase C: Blue.
   c. Colors for 480/277-V Circuits:
      1) Phase A: Brown.
      2) Phase B: Orange.
      3) Phase C: Yellow.
   d. Field-Applied, Color-Coding Conductor Tape: Apply in half-lapped turns for a minimum distance of 6 inches from terminal points and in boxes where splices or taps are made. Apply last two turns of tape with no tension to prevent possible unwinding. Locate bands to avoid obscuring factory cable markings.

D. Install instructional sign including the color-code for grounded and ungrounded conductors using adhesive-film-type labels.

E. Conductors to Be Extended in the Future: Attach marker tape to conductors and list source.

F. Auxiliary Electrical Systems Conductor Identification: Identify field-installed alarm, control, and signal connections.

   1. Identify conductors, cables, and terminals in enclosures and at junctions, terminals, and pull points. Identify by system and circuit designation.
   2. Use system of marker tape designations that is uniform and consistent with system used by manufacturer for factory-installed connections.

G. Locations of Underground Lines: Identify with underground-line warning tape for power, lighting, communication, and control wiring and optical fiber cable.

   1. Limit use of underground-line warning tape to direct-buried cables.
   2. Install underground-line warning tape for both direct-buried cables and cables in raceway.

H. Workspace Indication: Install floor marking tape to show working clearances in the direction of access to live parts. Workspace shall be as required by NFPA 70 and 29 CFR 1926.403 unless otherwise indicated. Do not install at flush-mounted panelboards and similar equipment in finished spaces.
I. Warning Labels for Indoor Cabinets, Boxes, and Enclosures for Power and Lighting: Baked-enamel warning signs.

2. Identify system voltage with black letters on an orange background.
3. Apply to exterior of door, cover, or other access.
4. For equipment with multiple power or control sources, apply to door or cover of equipment including, but not limited to, the following:
   
   a. Power transfer switches.
   b. Controls with external control power connections.

J. Operating Instruction Signs: Install instruction signs to facilitate proper operation and maintenance of electrical systems and items to which they connect. Install instruction signs with approved legend where instructions are needed for system or equipment operation.

K. Emergency Operating Instruction Signs: Install instruction signs with white legend on a red background with minimum 3/8-inch-high letters for emergency instructions at equipment used for power transfer.

L. Equipment Identification Labels: Unless otherwise noted, equipment identified in place shall be affixed in self tapping machine screws. On each unit of equipment, install unique designation label that is consistent with wiring diagrams, schedules, and the Operation and Maintenance Manual. Apply labels to disconnect switches and protection equipment, central or master units, control panels, control stations, terminal cabinets, and racks of each system. Systems include power, lighting, control, communication, signal, monitoring, and alarm systems unless equipment is provided with its own identification.

1. Labeling Instructions:
   
   a. Indoor Equipment: Engraved, laminated acrylic or melamine label. Unless otherwise indicated, provide a single line of text with 1/2-inch-high letters on 1-1/2-inch-high label; where two lines of text are required, use labels 2 inches high.
   b. Outdoor Equipment: Engraved, laminated acrylic or melamine label.
   c. Elevated Components: Increase sizes of labels and letters to those appropriate for viewing from the floor.
   d. Fasten all equipment labels that do not

END OF SECTION
SECTION 16573
OVERCURRENT PROTECTIVE DEVICE COORDINATION STUDY

PART 1 - GENERAL

1.1 SUMMARY

A. This Section includes computer-based, fault-current and overcurrent protective device coordination studies. Protective devices shall be set based on results of the protective device coordination study.

1. Series rating is not permitted.

2. The electrical contractor shall provide and furnish the submittals noted in 1.2 of this section based upon the contractor submitted upon, approved and installed project equipment.

1.2 SUBMITTALS

A. Other Action Submittals: The following submittals shall be made after the approval process for system protective devices has been completed.

1. Coordination-study input data, including completed computer program input data sheets.
2. Study and Equipment Evaluation Reports.

1.3 QUALITY ASSURANCE

A. Coordination-Study Specialist Qualifications: An entity experienced in the application of computer software used for studies, having performed successful studies of similar magnitude on electrical distribution systems using similar devices.

1. Professional engineer, licensed in the state where Project is located, shall be responsible for the study. All elements of the study shall be performed under the direct supervision and control of engineer.

2. Switchgear manufacturer.

B. Comply with IEEE 242 for short-circuit currents and coordination time intervals.

C. Comply with IEEE 399 for general study procedures.
PART 2 - PRODUCTS – NOT USED

PART 3 - EXECUTION

3.1 POWER SYSTEM DATA

A. Gather and tabulate the following input data to support coordination study:

1. Product Data for overcurrent protective devices specified in other Division 26 Sections and involved in overcurrent protective device coordination studies. Use equipment designation tags that are consistent with electrical distribution system diagrams, overcurrent protective device submittals, input and output data, and recommended device settings.

2. Impedance of utility service entrance.

3. Electrical Distribution System Diagram: In hard-copy and electronic-copy formats, showing the following:
   a. Circuit-breaker and fuse-current ratings and types.
   b. Relays and associated power and current transformer ratings and ratios.
   c. Transformer kilovolt amperes, primary and secondary voltages, connection type, impedance, and X/R ratios.
   d. Generator kilovolt amperes, size, voltage, and source impedance.
   e. Cables: Indicate conduit material, sizes of conductors, conductor material, insulation, and length.
   f. Busway ampacity and impedance.
   g. Motor horsepower and code letter designation according to NEMA MG 1.

4. Data sheets to supplement electrical distribution system diagram, cross-referenced with tag numbers on diagram, showing the following:
   a. Special load considerations, including starting inrush currents and frequent starting and stopping.
   b. Transformer characteristics, including primary protective device, magnetic inrush current, and overload capability.
   c. Motor full-load current, locked rotor current, service factor, starting time, type of start, and thermal-damage curve.
   d. Generator thermal-damage curve.
   e. Ratings, types, and settings of utility company’s overcurrent protective devices.
   f. Special overcurrent protective device settings or types stipulated by utility company.
   g. Time-current-characteristic curves of devices indicated to be coordinated.
   h. Manufacturer, frame size, interrupting rating in amperes rms symmetrical, ampere or current sensor rating, long-time adjustment range, short-time adjustment range, and instantaneous adjustment range for circuit breakers.
   i. Manufacturer and type, ampere-tap adjustment range, time-delay adjustment range, instantaneous attachment adjustment range, and current transformer ratio for overcurrent relays.
   j. Panelboards, switchboards, motor-control center ampacity, and interrupting rating in amperes rms symmetrical.
3.2 FAULT-CURRENT STUDY

A. Calculate the maximum available short-circuit current in amperes rms symmetrical at circuit-breaker positions of the electrical power distribution system. The calculation shall be for a current immediately after initiation and for a three-phase bolted short circuit at each of the following:

1. Switchgear and switchboard bus.
2. Medium-voltage controller.
3. Motor-control center.
4. Distribution panelboard.
5. Branch circuit panelboard.

B. Study electrical distribution system from normal and alternate power sources throughout electrical distribution system for Project. Include studies of system-switching configurations and alternate operations that could result in maximum fault conditions.

C. Calculate momentary and interrupting duties on the basis of maximum available fault current.

D. Calculations to verify interrupting ratings of overcurrent protective devices shall comply with IEEE 241 and IEEE 242.

1. Transformers:
   a. ANSI C57.12.22.
   b. IEEE C57.12.00.
   c. IEEE C57.96.

4. Low-Voltage Fuses: IEEE C37.46.

E. Study Report:

1. Show calculated X/R ratios and equipment interrupting rating (1/2-cycle) fault currents on electrical distribution system diagram.

F. Equipment Evaluation Report:

1. For 600-V overcurrent protective devices, ensure that interrupting ratings are equal to or higher than calculated 1/2-cycle symmetrical fault current.
2. For devices and equipment rated for asymmetrical fault current, apply multiplication factors listed in the standards to 1/2-cycle symmetrical fault current.
3. Verify adequacy of phase conductors at maximum three-phase bolted fault currents; verify adequacy of equipment grounding conductors and grounding electrode conductors at maximum ground-fault currents. Ensure that short-circuit withstand ratings are equal to or higher than calculated 1/2-cycle symmetrical fault current.

3.3 COORDINATION STUDY


1. Calculate the maximum and minimum 1/2-cycle short-circuit currents.
2. Calculate the maximum and minimum interrupting duty (5 cycles to 2 seconds) short-circuit currents.
3. Calculate the maximum and minimum ground-fault currents.

B. Comply with IEEE 241 recommendations for fault currents and time intervals.

C. Transformer Primary Overcurrent Protective Devices:

1. Device shall not operate in response to the following:
   a. Inrush current when first energized.
   b. Self-cooled, full-load current or forced-air-cooled, full-load current, whichever is specified for that transformer.
   c. Permissible transformer overloads according to IEEE C57.96 if required by unusual loading or emergency conditions.

2. Device settings shall protect transformers according to IEEE C57.12.00, for fault currents.

D. Conductor Protection: Protect cables against damage from fault currents according to ICEA P-32-382, ICEA P-45-482, and conductor melting curves in IEEE 242. Demonstrate that equipment withstands the maximum short-circuit current for a time equivalent to the tripping time of the primary relay protection or total clearing time of the fuse. To determine temperatures that damage insulation, use curves from cable manufacturers or from listed standards indicating conductor size and short-circuit current.

E. Coordination-Study Report: Prepare a written report indicating the following results of coordination study:

1. Tabular Format of Settings Selected for Overcurrent Protective Devices:
   a. Device tag.
   b. Relay-current transformer ratios; and tap, time-dial, and instantaneous-pickup values.
   c. Circuit-breaker sensor rating; and long-time, short-time, and instantaneous settings.
   d. Fuse-current rating and type.
   e. Ground-fault relay-pickup and time-delay settings.

2. Coordination Curves: Prepared to determine settings of overcurrent protective devices to achieve selective coordination. Graphically illustrate that adequate time separation exists between devices installed in series, including power utility company's upstream devices. Prepare separate sets of curves for the switching schemes and for emergency periods where the power source is local generation. Show the following information:
   a. Device tag.
   b. Voltage and current ratio for curves.
   c. Three-phase and single-phase damage points for each transformer.
   d. No damage, melting, and clearing curves for fuses.
   e. Cable damage curves.
   f. Transformer inrush points.
   g. Maximum fault-current cutoff point.

F. Completed data sheets for setting of overcurrent protective devices.

END OF SECTION
SECTION 16600
LIGHTING

PART 1 - GENERAL

1.01 GENERAL REQUIREMENTS

A. Provide U.L. listed lighting fixtures complete with lamps at light outlets indicated on the drawings. Each fixture shall bear the U.L. Label, and shall comply with Code Requirements. Exterior fixtures shall be U.L. approved for the location and shall be so labeled.

B. Fixtures are listed and described in the Fixture Schedule and in the following paragraphs. Fixture catalog numbers are to be used as a guide only and be understood to be preceded by the words "similar to" and followed by the words "except as modified by the total fixture description both text and pictorial". Provide accessories, features and adaptations necessary to meet the requirements of the description.

C. If the fixture designation is omitted from a light outlet, assume a fixture of the type used in similar areas in preparing the Bid. Confirm type with Architect prior to ordering.

1.02 SUBMITTALS

A. Type written material list with all catalog numbers indexed to the drawings and specifications.

B. Catalog cuts of all lighting fixtures, ballasts, and lamps.

C. Shop Drawings

1.03 ACCEPTABLE MANUFACTURERS

A. Ballast: Advance, Valmont Electric, Jefferson, Universal, or Sola, unless specifically indicated.

B. Lamps: Sylvania, General Electric, N.A. Phillips or Venture, unless specifically indicated.

1.04 LAMP REPLACEMENT

A. Replace lamps which burn out after Owner's use or acceptance of the project or of an area in the case of beneficial occupancy.

B. Lamps (except incandescent) which burn out within 120 days.

C. Incandescent lamps which burn out after usage which is less than 80% of rated life.

PART 2 - PRODUCTS

2.01 GENERAL PRODUCTS REQUIREMENTS

A. Fixtures shall be complete with all required accessories and equipment, including lamps, necessary for a complete installation.

B. Fixtures and luminaires of one type shall be of one manufacturer and of identical finish and
appearance. All lamps of the same type shall be by the same manufacturer.

C. Fixtures and trims shall be assembled and installed with care to avoid and eliminate light leaks. Where necessary, gasketing, patching, or other effective means shall be used. There shall be no entry for insects or dirt into any fixture.

D. Totally enclosed lamp compartments of HID luminaires located outside shall have activated charcoal filters to allow breathing without transfer of contaminants.

E. Verify the ceiling or wall construction, and the mounting requirements of each fixture and provide plaster frames, special flanges, concrete pour housings, boxes, brackets, adapters, hangers, stems, canopies, special ballasts or lenses, and other materials necessary to properly purchase and mount the fixture.

F. Four hanger wires shall be provided for each recessed troffer. Locate at diagonal corners.

G. Where required, all fixtures shall be provided with tamper resistant screw.

H. Submit shop drawings on all fixtures as required under "Submittals." "Shop drawings" may be catalog data sheets if complete information including mounting hardware is shown and identified. Shop drawings shall include mounting details and show compatibility with the ceiling, pole, bracket or other equipment.

I. Finish: Treat surface mounted fixtures and exposed trim of recessed fixtures with a rust-inhabitant process. This process shall be Bonderlite or Oakite Cryscat or equal zinc phosphate bonding process. Refer to PAINT, FINISHES, AND COLORS Subsection.

J. Optical Systems: Lighting fixtures for use with MH lamps shall have the optical system specifically designed for a clear MH lamp of the wattage indicated.

K. Reflectors for multi-phosphorous lamps, including all compact fluorescent lamps, shall be low-iridescent finish to minimize rainbow effect on reflector.

L. Ballast Wiring: Where multiple level switching of fluorescent fixtures is indicated on the drawings, wire ballast for symmetrical grouping of lamps. For example in four lamp fixtures, two inner and two outer lamps shall be switch controlled. Two three-lamp fluorescent fixtures mounted end to end shall have the center lamps connected to one two-lamp ballast in either fixture.

M. Fixture Pendants: Pendant fixtures shall have metal stems. Non-metallic (cord type) stems will not be permitted. Where a pendant fixture has a standard non-metallic stem, replace it with a metal stem before installation.

N. All pendant fixtures shall be supported by metal stems provided with ball swivel hangers at both ends of stems which permit lateral movement to 45 degrees maximum from the vertical. Provide a stainless steel safety cable inside of each stem securely attached to the fixture body and to the building structure independent of the outlet box.

2.02 LIGHT TRANSMITTING PLASTICS

A. All plastic shall be 100% virgin acrylic.

B. Pattern #12 lenses shall be minimum .125” thick overall with .08” prism depth.
C. Provide lenses for soffits and lighting coves according to the following schedule. Lens dimensions shall be selected based on actual dimensions of the installed soffit or cove.

1. 5/8” x 5/8” x 7/16” deep aluminum louver. A.L.P. series Para-Lite 2.

2. Locations: Soffits in all toilet rooms. See architectural drawings.

2.03 POLES

A. All poles shall be designed by the pole manufacturer to safely support the total Effective Projected Area (EPA) of luminaires, arms and accessories with a wind rating of 100 MPH with 1.3 gust factor.

2.04 BALLAST

A. Electronic Fluorescent Ballasts:

1. All ballasts shall be UL listed, Class P, High Power factor (above 90%), sound rated A and shall be warranted for a minimum of three years from date of installation, including a replacement labor allowance.

2. Ballast input wattage for a two lamp F032/T8/32 watt application shall be 58 watts or less.

B. Electronic Ballast:

1. Provide electronic ballasts in all fluorescent fixtures for which they are available. Electronic ballasts shall be high power factor, sound rated ‘A’, contain no PCB and be listed by U.L. Ballasts shall have fewer than 32 components and operate at 20 to 35 KHZ. Ballast shall be fully potted and within steel case, operating temperature of ballasts shall not exceed 80°C at any point on the case. Ballast shall be surge and transient protected to 6000 volts and shall comply with FCC or NEMA limits as to EMI or RFI and not interfere with the operation of other electrical equipment. Ballast shall carry a three year unconditional warranty for labor and materials. Ballasts shall be approved by the local utility company for energy rebates.

C. Emergency battery pack ballasts for fluorescent lighting fixtures shall consist of an automatic power failure device, single pole test switch, and fully automatic solid-state charge and indicator light in a self-contained power pack furnished by the fixture manufacturer as an integral part of the fixture. Electronic circuitry shall be self-testing in design and automatically test the unit every 30 days for 30 seconds, and initiate a 90 minute discharge test once a year. An embedded microcontroller will continually monitor battery charging current and voltage. Audible alarm and a light-emitting diode will be provided to indicate test results and status conditions. Charger shall be either trickle, float, constant current or constant potential type, or a combination of these. Battery shall be maintenance free nickel cadmium type with capacity to supply power to one or two lamps for each fixture in emergency mode for 90 minutes minimum with a light output of 1100 lumens minimum. Unit shall be capable of operating a dead fluorescent lamp.

D. Fluorescent and HID ballasts and emergency battery pack ballasts shall be guaranteed for three years.

2.05 LAMPS
A. Lamp wattage, type, color and style shall be as shown on the fixture schedule. All lamps of the same type shall be by the same manufacturer.

B. Incandescent lamps shall be inside frosted, 130 volt rating.

C. Fluorescent lamps shall be 32 watt, 2850 lumen energy saving type T8, 4100K or equal, unless noted otherwise in the fixture schedule.

D. H.I.D. lamps shall be by GE, Venture, Sylvania, or N.A. Phillips, Osram, Mercury lamps shall be color corrected. Metal halide lamps shall be specifically selected to provide a uniform match of lamp color appearance. The Architect shall be the judge of what constitutes reasonable uniformity of color.

**2.06 ELECTRONIC TIME SWITCHES**

A. Time switches shall be a Tork 7200KL or equal, 2-circuit programmable time control with the following features:

B. 365 day per year programming to control lighting circuits for daylight savings periods, 16 events per day, or 112 events per week per channel, power outage carryover powered by lithium battery.

C. Voltage shall be 277V.

**2.07 LENSES**

A. Light transmitting plastics:

   1. All plastic shall be 100% virgin acrylic. Pattern #12 lenses shall be minimum .125" thick overall with .08" prism depth.

B. Glass:

   1. Glass used for lenses, refractors, and diffusers in incandescent lighting fixtures shall be tempered for high impact and heat resistance; the glass shall be crystal clear in quality with a transmittance of not less than 88%. For exterior fixtures use tempered Borosilicate glass, Corning #7740 or equal. For fixtures directly exposed to the elements and aimed above the horizontal, use Corning Vycor glass or equal.

**2.08 EMERGENCY/EGRESS FIXTURES**

A. Exit Sign Fixtures:

   1. Emergency exit sign fixtures with illumination by LED’s (Light Emitting Diodes), providing even illumination of letters through an optical diffuser to meet or exceed requirements of NFPA Life Safety Code 101 UL-924, and the OSHA code. The power supply shall be dual input 120/277V 60 Hz. All components shall be solid state, with surge protection and short circuit protection and each LED shall be individually driven such that failure of one will not affect another.

B. Self-Contained Emergency Lighting Unit:

   1. Provide compact, wall mounted emergency lighting unit containing the following:
a. Six or 12 volt nickel cadmium battery capable of supplying 50 watts for a period of at least three hours, with guaranteed life of at least five years.

b. FULLY DISCHARGED to FULLY CHARGED period of 12 hours.

c. Two sealed beam 25 watt, fully adjustable lamps mounted on unit.

d. Relay automatically energizing lights upon loss of 120/277 volt, 60 Hz power.

e. Toggle switch in each lamp circuit so that each lamp may be turned off individually.

f. Time delay relay to keep units energized for ten minutes after normal lighting is restored.

g. Protective circuits shall include low voltage battery disconnect, and brownout protection.

h. Each unit shall have diagnostic circuitry which shall constantly monitor the charger performance and battery voltage.

i. Each unit shall be programmed to exercise the battery and check emergency operation by automatically performing a 5 minute discharge/diagnostic test every 28 days and a 30 minute discharge/diagnostic cycle every six months.

PART 3 - EXECUTION

3.01 FIXTURE MOUNTING

A. Provide fixture supports, including supports for any lighting fixtures furnished by others. Design (including the frames) of recessed fixtures shall be compatible with the ceiling construction. Verify the type of ceiling and suspension method prior to ordering fixtures. Architects favorable review of the shop drawings for both the ceiling system and the lighting fixtures, with "No Exception Taken" or "approved" on the Architect’s stamp, will not relieve the Contractor of the ceiling/lighting fixture compatibility requirement.

B. Mount pendant fixtures at the heights indicated on the drawings, unless otherwise directed by Architect. Fixture shall be approved earthquake resistant hangers if code required and have movable joints at ceiling and fixture when more than one stem is used per fixture. Support fixtures mounted on suspended ceiling directly from the structure above using a #9 wire. The runner shall not be used in the support linkage, but shall be bypassed with a suitable device.

C. Securely clip or bolt recessed fluorescent fixtures to ceiling support system by a Code approved method.

D. Attach surface fixtures mounted on accessible panel type suspended ceiling to main runner with a positive clamping device made of minimum 14 gauge steel. Rotational spring catches will not be permitted. Attach a suspension wire to the main runners within 6” of the location so that the fixture loads the runner (at least two wires per fixture). Mount fixtures on combustible ceilings on spacers as required by Code unless Code approved for mounting directly on ceiling.

3.02 FIXTURE INSTALLATION

A. Provide outlet boxes for recessed fixtures in a manner approved by the code. Provide
appropriately temperature rated insulation for branch wires to recessed fixtures.

B. Provide fixtures in a manner to prevent light leaks. For exterior fixtures provide seals and gasketing to prevent insect entry into the fixtures. If soffit recessed fixtures are not available with a sealed housing, provide effective gasketing for the lens and for the lens trim/soffit surface interface.

3.03 LIGHTING STANDARDS AND BASES (FOOTINGS)

A. Carefully clean out the edges and corners at the bottom of the excavations to give a level compacted floor for the footing. Shape the footing by forms from the top down to 6” below grade.

B. Conduits and anchor bolts shall be held in place with templates or other approved means during placing of concrete, and shall rise vertically in the base.

C. Provide a ½” chamfer around the perimeter of the top of the base and dress the green concrete (sides and top) with a sacking finish. Top surface shall be dead level so the flange of the standard can bear directly against the concrete. Stainless steel shims may be used for minor adjustments required to make the standard plumb by they shall have adequate bearing area against the concrete and shall not extend beyond the flange cover.

D. If the double nut method of plumb adjustment is used, the bottom nuts shall be set-in flush with the top of the footing with only enough blockout around each nut to allow it to spin upward. At completion of plumb adjustment a portion of the edge of flange shall touch the concrete. The space between the flange and the concrete shall be dry-pack grouted.

E. If the flange cover set screws do not bear against the flange because of excessive plumb adjustment, affix an extension piece to the underside of flange to give a solid bearing surface for the set screws.

F. Final pole base installation shall be the manufacturers installation instructions accompanied with product to include material use and installation dimensions.

END OF SECTION
SECTION 16726
WIRING DEVICES

PART 1 - GENERAL

1.1 SUMMARY

A. This Section includes the following:

1. Receptacles, receptacles with integral GFCI, and associated device plates.
2. Wall-box motion sensors.
3. Snap switches and wall-box dimmers.
4. Solid-state fan speed controls.
5. Wall-switch and exterior occupancy sensors.
6. Communications outlets.

1.2 SUBMITTALS

A. Product Data: For each type of product indicated.

B. Shop Drawings: List of legends and description of materials and process used for pre-marking wall plates.

C. Operation and Maintenance Data: For wiring devices to include in all manufacturers’ packing label warnings and instruction manuals that include labeling conditions.

1.3 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. Comply with NFPA 70.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Manufacturers’ Names: Shortened versions (shown in parentheses) of the following manufacturers’ names are used in other Part 2 articles:

1. Cooper Wiring Devices; a division of Cooper Industries, Inc. (Cooper).
2. Hubbell Incorporated; Wiring Device-Kellems (Hubbell).
4. Pass & Seymour/Legrand; Wiring Devices & Accessories (Pass & Seymour).
5. Or equal.

2.2 STRAIGHT BLADE RECEPTACLES

A. Convenience Receptacles, 125 V, 20 A: Comply with NEMA WD 1, NEMA WD 6 configuration 5-20R, and UL 498.

1. Available Products: Subject to compliance with requirements, products that may be incorporated into the Work include, but are not limited to, the following:
2. Products: Subject to compliance with requirements, provide one of the following:
   a. Cooper; 5351 (single), 5352 (duplex).
   b. Hubbell; HBL5351 (single), CR5352 (duplex).
   c. Leviton; 5891 (single), 5352 (duplex).
   d. Pass & Seymour; 5381 (single), 5352 (duplex).
   e. Or equal.

2.3 GFCI RECEPTACLES

A. General Description: Straight blade, non-feed through type. Comply with NEMA WD 1, NEMA WD 6, UL 498, and UL 943, Class A, and include indicator light that is lighted when device is tripped.

B. Duplex GFCI Convenience Receptacles, 125 V, 20 A:

1. Available Products: Subject to compliance with requirements, products that may be incorporated into the Work include, but are not limited to, the following:
2. Products: Subject to compliance with requirements, provide one of the following:
   a. Cooper; GF20.
   b. Pass & Seymour; 2084.
   c. Or equal.

2.4 SNAP SWITCHES

A. Comply with NEMA WD 1 and UL 20.

B. Switches, 120/277 V, 20 A:

1. Available Products: Subject to compliance with requirements, products that may be incorporated into the Work include, but are not limited to, the following:
2. Products: Subject to compliance with requirements, provide one of the following:
   a. Cooper; 2221 (single pole), 2222 (two pole), 2223 (three way), 2224 (four way).
   b. Hubbell; CS1221 (single pole), CS1222 (two pole), CS1223 (three way), CS1224 (four way).
   c. Leviton; 1221-2 (single pole), 1222-2 (two pole), 1223-2 (three way), 1224-2 (four way).
   d. Pass & Seymour; 20AC1 (single pole), 20AC2 (two pole), 20AC3 (three way), 20AC4 (four way).
   e. Or equal.
C. Key-Operated Switches, 120/277 V, 20 A:

1. Available Products: Subject to compliance with requirements, products that may be incorporated into the Work include, but are not limited to, the following:
2. Products: Subject to compliance with requirements, provide one of the following:
   a. Cooper; 2221L.
   b. Hubbell; HBL1221L.
   c. Leviton; 1221-2L.
   d. Pass & Seymour; PS20AC1-L.
   e. Or equal.

3. Description: Single pole, with factory-supplied key in lieu of switch handle.

D. Single-Pole, Double-Throw, Momentary Contact, Center-Off Switches, 120/277 V, 20 A; for use with mechanically held lighting contactors.

1. Available Products: Subject to compliance with requirements, products that may be incorporated into the Work include, but are not limited to, the following:
2. Products: Subject to compliance with requirements, provide one of the following:
   b. Hubbell; HBL1557.
   c. Leviton; 1257.
   d. Pass & Seymour; 1251.
   e. Or equal.

2.5 WALL PLATES

A. Single and combination types to match corresponding wiring devices.

1. Plate-Securing Screws: Metal with head color to match plate finish.
2. Material for interior Spaces: Smooth, white, high-impact thermoplastic.
3. Material for Damp Locations: stainless steel with spring-loaded lift cover, and listed and labeled for use in "wet locations."

B. Wet-Location, Weatherproof Cover Plates: NEMA 250, complying with type 3R weather-resistant stainless steel with lockable cover.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Comply with NECA 1, including the mounting heights listed in that standard, unless otherwise noted.

B. Coordination with Other Trades:

1. Take steps to insure that devices and their boxes are protected. Do not place wall finish materials over device boxes and do not cut holes for boxes with routers that are guided by riding against outside of the boxes.
2. Keep outlet boxes free of plaster, drywall joint compound, mortar, cement, concrete, dust, paint, and other material that may contaminate the raceway system, conductors, and cables.
3. Install device boxes in brick or block walls so that the cover plate does not cross a joint unless the joint is troweled flush with the face of the wall.
4. Install wiring devices after all wall preparation, including painting, is complete.

C. Conductors:

1. Do not strip insulation from conductors until just before they are spliced or terminated on devices.
2. Strip insulation evenly around the conductor using tools designed for the purpose. Avoid scoring or nicking of solid wire or cutting strands from stranded wire.
3. The length of free conductors at outlets for devices shall meet provisions of NFPA 70, Article 300, without pigtails.
4. Existing Conductors:
   a. Cut back and pigtail, or replace all damaged conductors.
   b. Straighten conductors that remain and remove corrosion and foreign matter.
   c. Pigtail existing conductors is permitted provided the outlet box is large enough.

D. Device Installation:

1. Replace all devices that have been in temporary use during construction or that show signs that they were installed before building finishing operations were complete.
2. Keep each wiring device in its package or otherwise protected until it is time to connect conductors.
3. Do not remove surface protection, such as plastic film and smudge covers, until the last possible moment.
4. Connect devices to branch circuits using pigtails that are not less than 6 inches in length.
5. When there is a choice, use side wiring with binding-head screw terminals. Wrap solid conductor tightly clockwise, 2/3 to 3/4 of the way around terminal screw.
6. Use a torque screwdriver when a torque is recommended or required by the manufacturer.
7. When conductors larger than No. 12 AWG are installed on 15- or 20-A circuits, splice No. 12 AWG pigtails for device connections.
8. Tighten unused terminal screws on the device.
9. When mounting into metal boxes, remove the fiber or plastic washers used to hold device mounting screws in yokes, allowing metal-to-metal contact.

E. Receptacle Orientation:

1. Install ground pin of vertically mounted receptacles down, and on horizontally mounted receptacles to the left.

F. Device Plates: Do not use oversized or extra-deep plates. Repair wall finishes and remount outlet boxes when standard device plates do not fit flush or do not cover rough wall opening.

G. Dimmers:

1. Install dimmers within terms of their listing.
2. Verify that dimmers used for fan speed control are listed for that application.
3. Install unshared neutral conductors on line and load side of dimmers according to manufacturers' device listing conditions in the written instructions.
H. Arrangement of Devices: Unless otherwise indicated, mount flush, with long dimension vertical and with grounding terminal of receptacles on top. Group adjacent switches under single, multigang wall plates.

3.2 IDENTIFICATION

A. Comply with Division 16 Section "Identification for Electrical Systems."

1. Receptacles: Identify panelboard and circuit number from which served. Use hot, stamped or engraved machine printing with white-filled lettering on black face of plate, and durable wire markers or tags inside outlet boxes.

3.3 FIELD QUALITY CONTROL

A. Perform tests and inspections and prepare test reports.

1. Test Instruments: Use instruments that comply with UL 1436.
2. Test Instrument for Convenience Receptacles: Digital wiring analyzer with digital readout or illuminated LED indicators of measurement.

B. Tests for Convenience Receptacles:

1. Line Voltage: Acceptable range is 105 to 132 V.
2. Percent Voltage Drop under 15-A Load: A value of 6 percent or higher is not acceptable.
3. Ground Impedance: Values of up to 2 ohms are acceptable.
4. GFCI Trip: Test for tripping values specified in UL 1436 and UL 943.
5. Using the test plug, verify that the device and its outlet box are securely mounted.
6. The tests shall be diagnostic, indicating damaged conductors, high resistance at the circuit breaker, poor connections, inadequate fault current path, defective devices, or similar problems. Correct circuit conditions, remove malfunctioning units and replace with new, and retest as specified above.

END OF SECTION
SECTION 16830
STRUCTURED CABLEING

PART 1 - GENERAL

1.1 SUMMARY

A. The contractor shall provide and install a complete and operational structured cabling system for voice and data throughout the project site as specified on the drawings and herein.

B. Section Includes:

1. Pathways.
2. UTP cabling.
3. Multiuser telecommunications outlet assemblies.
4. Cable connecting hardware, patch panels, and cross-connects.
5. Telecommunications outlet/connectors.
7. Cabling administration system.

1.2 HORIZONTAL CABLE DESCRIPTION

A. Horizontal cable and its connecting hardware provide the means of transporting signals between the telecommunications outlet/connector and the horizontal cross-connect located in the communications equipment room. This cabling and its connecting hardware are called "permanent link," a term that is used in the testing protocols.

1. TIA/EIA-568-B.1 requires that a minimum of two telecommunications outlet/connectors be installed for each work area.
2. Horizontal cabling shall contain no more than one transition point or consolidation point between the horizontal cross-connect and the telecommunications outlet/connector.
3. Bridged taps and splices shall not be installed in the horizontal cabling.

1.3 PERFORMANCE REQUIREMENTS

A. General Performance: Horizontal cabling system shall comply with transmission standards in TIA/EIA-568-B.1, when tested according to test procedures of this standard.

B. The contractor shall provide at the time of bid references of comparable project types and manufacturers certification as a factory authorized and trained installer.

C. The contractor shall be responsible for obtaining all licenses and permits as required by the local "AHJ".

D. The contractor shall warranty the entire systems function and performance as specified herein for a period of 15 years from the data of final acceptance.
1.4 SUBMITTALS

A. Product Data: For each type of product indicated.

B. Shop Drawings:
   1. System Labeling Schedules: Electronic and hard copy of labeling schedules, in format selected by Owner.
   2. Cabling administration drawings and printouts.
   3. Wiring diagrams to show typical wiring schematics, including the following:
      b. Patch panels.
      c. Patch cords.
   4. Cross-connects and patch panels. Detail mounting assemblies, and show elevations and physical relationship between the installed components.
   5. Cable tray layout, showing cable tray route to scale, with relationship between the tray and adjacent structural, electrical, and mechanical elements. Include the following:

C. Qualification Data: Provide documentation as a manufacturer trained and authorized installer.

D. Source quality-control reports.

E. Field quality-control reports.

F. Maintenance data.

1.5 QUALITY ASSURANCE

A. Installer Qualifications: Cabling Installer must have personnel certified by BICSI on staff.
   1. Layout Responsibility: Preparation of Shop Drawings by an RCDD.
   2. Installation Supervision: Installation shall be under the direct supervision of factory certified installers, who shall be present at all times when Work of this Section is performed at Project site.

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. Telecommunications Pathways and Spaces: Comply with TIA/EIA-569-A.


1.6 DELIVERY, STORAGE, AND HANDLING

A. Test cables upon receipt at Project site. Test each pair of UTP cable for open and short circuits.
PART 2 - PRODUCTS

2.1 PATHWAYS

A. Cable Trays:

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
   a. Cable Management Solutions, Inc.
   b. CPI
   c. Cooper B-Line, Inc.

2. Cable Tray Materials: Metal, suitable for indoors, and protected against corrosion by electroplated zinc galvanizing.
   a. Ladder Cable Trays: Aluminum 12” wide by 3” deep with maximum ring space of 9”.

B. Conduit and Boxes: Comply with requirements in Division 16 Section "Raceway and Boxes for Electrical Systems." Flexible metal conduit shall not be used.

   1. Outlet boxes shall be no smaller than 2 inches (50 mm) wide, 3 inches (75 mm) high, and 2-1/2 inches (64 mm) deep.

2.2 BACKBOARDS

A. Backboards: Plywood, fire-retardant treated, 3/4 by 48 by 96 inches painted to match adjacent wall color. See plans for walls.

2.3 UTP CABLE (Category 6)

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

   1. AMP.
   2. Avaya.
   3. CommScope, Inc.

B. Description: 100-ohm, 4-pair UTP, covered with a blue thermoplastic jacket.

   1. Comply with ICEA S-90-661 for mechanical properties.
   2. Comply with TIA/EIA-568-B.1 for performance specifications.
   4. Listed and labeled by an NRTL acceptable to authorities having jurisdiction as complying with UL 444 and NFPA 70 for the following types:

       a. Communications, General Purpose: Type CM or CMG
2.4 UTP CABLE HARDWARE

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1. KRONE Incorporated

B. General Requirements for Cable Connecting Hardware: Comply with TIA/EIA-568-B.2, IDC type, with modules designed for punch-down caps or tools. Cables shall be terminated with connecting hardware of same category or higher.

C. Patch Panels:
1. Shall be Krone #6527/1/630 or equal series, 48-way, unshielded.
2. Patch panels shall be mounted in 19” CPI data rack.
3. Cabling shall terminate on RJ45 568B termination blocks, (Krone High Density, no substitutions).
4. Individual termination blocks shall be provided in 8-pair increments to allow 4-pair cable to be terminated to each block.
5. The products shall have a separate port for patching, testing, and disconnecting that is independent of the insulation displacement contact (IDC).

D. Outlet Terminations:
1. Shall be Category 6, unshielded, (Krone #6537/1/001/00, no substitutions).
2. All jacks shall be RJ45 configured for T568B wiring and must exceed the Category 6 NEXT requirements -40dB per TIA/EIA 568A.
3. Jacks shall be white and provided as individual units.

E. Equipment Terminations:
1. All equipment port will be connected via individual runs of enhanced category 6 cable to a termination field adjacent to the horizontal cabling field.
2. Terminations for these cables shall match the performance and model of the terminations used in the horizontal system, (Krone, no substitutions).

F. Patch Cords:
1. Factory-made, four-pair cables in 48-inch in length at MDF locations terminated with eight-position modular plug at each end (Krone Highband, no substitutions).
2. Factory-made, four-pair cables in 10'-0" in length at outlet locations terminated with eight-position modular plug at each end (Krone Highband, no substitutions).
3. Patch cords shall have bend-relief-compliant boots and color-coded icons to ensure Category 6 performance. Patch cords shall have latch guards to protect against snagging.
4. Patch cords shall have color-coded boots for circuit identification.

2.5 TELECOMMUNICATIONS OUTLET/CONNECTORS


B. Outlets: Two port-connector assemblies mounted in single faceplate.

   a. Dual data outlet shall be faceplate by Krone type 6644-1-152-01.
   b. Quad data outlet shall be faceplate by Krone type 6644-1-154-01.
c. Provide port blanks for any port not in use.

2. Metal Faceplate: Stainless steel with port quantity per plans.
3. For use with snap-in jacks accommodating any combination of UTP work area cords.
   a. Flush mounting jacks, positioning the cord at a 45-degree angle.


2.6 Networking Switch:
   A. Provide NP Procurve Networking Switch 410g1 series or equal, one (1) per open rack system to include all mounting hardware.

2.7 Equipment Rack:
   A. Provide CPI Universal 46353-703 powder coat painted finish, grounding provisions, rack cable management provisions, top and bottom cable access, leveling feet with caterers, rack mount shelves with vertical and master cabling section.
      1. Provide cable tray bracing to include seismic bolts to floor and wall.
      2. Provide cable tray with one (1) rack mounted power strip "APC" #NET9RM with nine (9) outlets and one always on outlet with guarded master-on-off switch.
      3. Provide an uninterruptable power supply (UPS), APC 2200va, 120V, rack mounted smart UPS. APC part #SU220R3X106 with L5-20 plug. Back shall consist of one 20-amp twistlock, two 20-amp, and four 15-amp receptacle, option #SU029RM3U.

2.8 GROUNDING
   A. Comply with requirements in Division 16 Section "Grounding and Bonding for Electrical Systems" for grounding conductors and connectors.
      1. Provide ground bus bar kit which shall be 1/4" x 1-1/2" copper mounted on insulated stand-offs. Tap bus bar with ten #10-32 N.F. screws.
   B. Comply with ANSI-J-STD-607-A.

2.9 IDENTIFICATION PRODUCTS
   A. Comply with TIA/EIA-606-A and UL 969 for a system of labeling materials, including label stocks, laminating adhesives, and inks used by label printers.
   B. Comply with requirements in Division 26 Section "Identification for Electrical Systems."

2.10 SOURCE QUALITY CONTROL
   A. Testing Agency: Engage a qualified testing agency to evaluate cables.
   B. Factory test UTP cables on reels according to TIA/EIA-568-B.1.
C. Factory test UTP cables according to TIA/EIA-568-B.2.
D. Cable will be considered defective if it does not pass tests and inspections.
E. Prepare test and inspection reports.

PART 3 - EXECUTION

3.1 ENTRANCE FACILITIES
A. Coordinate backbone cabling with the protectors and demarcation point provided by communications service provider.

3.2 WIRING METHODS
A. Wiring Method: Install all cables in raceways and cable trays.
B. Comply with requirements for raceways and boxes specified in Division 26 Section "Raceway and Boxes for Electrical Systems."
C. Wiring Method: Conceal conductors and cables in accessible ceilings, walls, and floors where possible.
D. Wiring within Enclosures: Bundle, lace, and train cables to terminal points with no excess and without exceeding manufacturer's limitations on bending radii. Provide and use lacing bars and distribution spools.

3.3 INSTALLATION OF PATHWAYS
A. Cable Trays: Comply with NEMA VE 2 and TIA/EIA-569-A-7.
B. Comply with TIA/EIA-569-A for pull-box sizing and length of conduit and number of bends between pull points.
C. Comply with requirements in Division 26 Section "Raceway and Boxes for Electrical Systems" for installation of conduits and wireways.
D. Install manufactured conduit sweeps and long-radius elbows whenever possible.
E. Pathway Installation in Communications Equipment Rooms:
1. Position conduit ends adjacent to a corner on backboard where a single piece of plywood is installed, or in the corner of room where multiple sheets of plywood are installed around perimeter walls of room.
2. Install cable trays to route cables if conduits cannot be located in these positions.
3. Secure conduits to backboard when entering room from overhead.
4. Extend conduits 3 inches above finished floor or below finish ceiling.
5. Install metal conduits with grounding bushings and connect with grounding conductor to grounding system.
F. Backboards: Install backboards with 96-inch (2440-mm) dimension vertical. Butt adjacent sheets tightly, and form smooth gap-free corners and joints.

3.4 INSTALLATION OF CABLES

A. Comply with NECA 1.

B. General Requirements for Cabling:

1. All Cabling shall be in EMT conduit, no exceptions.
3. Comply with BICSI ITSIM, Ch. 6, "Cable Termination Practices."
4. Install 110-style IDC termination hardware unless otherwise indicated.
5. Consolidation points may be used only for making a direct connection to telecommunications outlet/ connectors:
   a. Do not use consolidation point as a cross-connect point, as a patch connection, or for direct connection to workstation equipment.
   b. Locate consolidation points for UTP at least 49 feet (15 m) from communications equipment room.
6. Terminate conductors; no cable shall contain unterminated elements. Make terminations only at indicated outlets, terminals, cross-connects, and patch panels.
7. Cables may not be spliced. Secure and support cables at intervals not exceeding 30 inches 6 inches from cabinets, boxes, fittings, outlets, racks, frames, and terminals.
8. Bundle, lace, and train conductors to terminal points without exceeding manufacturer's limitations on bending radii, but not less than radii specified in BICSI ITSIM, "Cabling Termination Practices" Chapter. Install lacing bars and distribution spools.
9. Do not install bruised, kinked, scored, deformed, or abraded cable. Do not splice cable between termination, tap, or junction points. Remove and discard cable if damaged during installation and replace it with new cable.
10. Pulling Cable: Comply with BICSI ITSIM, Ch. 4, "Pulling Cable." Monitor cable pull tensions.

C. UTP Cable Installation:

2. Do not untwist UTP cables more than 1/2 inch (12 mm) from the point of termination to maintain cable geometry.

D. Separation from EMI Sources:

1. Comply with BICSI TDMM and TIA/EIA-569-A for separating unshielded copper voice and data communication cable from potential EMI sources, including electrical power lines and equipment.
2. Separation between open communications cables or cables in nonmetallic raceways and unshielded power conductors and electrical equipment shall be as follows:
   a. Electrical Equipment Rating Less Than 2 kVA: A minimum of 5 inches (127 mm).
   b. Electrical Equipment Rating between 2 and 5 kVA: A minimum of 12 inches (300 mm).
   c. Electrical Equipment Rating More Than 5 kVA: A minimum of 24 inches (610 mm).
3. Separation between communications cables in grounded metallic raceways and unshielded power lines or electrical equipment shall be as follows:
   a. Electrical Equipment Rating Less Than 2 kVA: A minimum of 2-1/2 inches (64 mm).
   b. Electrical Equipment Rating between 2 and 5 kVA: A minimum of 6 inches (150 mm).
   c. Electrical Equipment Rating More Than 5 kVA: A minimum of 12 inches (300 mm).

4. Separation between communications cables in grounded metallic raceways and power lines and electrical equipment located in grounded metallic conduits or enclosures shall be as follows:
   b. Electrical Equipment Rating between 2 and 5 kVA: A minimum of 3 inches (76 mm).
   c. Electrical Equipment Rating More Than 5 kVA: A minimum of 6 inches (150 mm).

5. Separation between Communications Cables and Electrical Motors and Transformers, 5 kVA or HP and Larger: A minimum of 48 inches (1200 mm).

6. Separation between Communications Cables and Fluorescent Fixtures: A minimum of 5 inches (127 mm).

3.5 FIRESTOPPING
   A. Comply with TIA/EIA-569-A, Annex A, "Firestopping."
   B. Comply with BICSI TDMM, "Firestopping Systems" Article.

3.6 GROUNDING
   A. Install grounding according to BICSI TDMM, "Grounding, Bonding, and Electrical Protection" Chapter.
   B. Comply with ANSI-J-STD-607-A.
   C. Locate grounding bus bar to minimize the length of bonding conductors. Fasten to wall allowing at least 2-inch (50-mm) clearance behind the grounding bus bar. Connect grounding bus bar with a minimum No. 4 AWG grounding electrode conductor from grounding bus bar to suitable electrical building ground.
   D. Bond metallic equipment to the grounding bus bar, using not smaller than No. 6 AWG equipment grounding conductor.

3.7 IDENTIFICATION
   A. Identify system components, wiring, and cabling complying with TIA/EIA-606-A. Comply with requirements for identification specified in Division 26 Section "Identification for Electrical Systems."
      1. Color-code cross-connect fields. Apply colors to voice and data service backboards, connections, covers, and labels.
   B. Cable Schedule: Post in prominent location in each equipment room and wiring closet. List incoming and outgoing cables and their designations, origins, and destinations. Protect with rigid frame and clear plastic cover. Furnish an electronic copy of final comprehensive schedules for Project.
C. Cable and Wire Identification:

1. Label each cable within 4 inches of each termination and tap, where it is accessible in a cabinet or junction or outlet box, and elsewhere as indicated.
2. Label each terminal strip and screw terminal in each cabinet, rack, or panel.
   a. Individually number wiring conductors connected to terminal strips, and identify each cable or wiring group being extended from a panel or cabinet to a building-mounted device shall be identified with name and number of particular device as shown.
   b. Label each unit and field within distribution racks and frames.

3. Identification within Connector Fields in Equipment Rooms and Wiring Closets: Label each connector and each discrete unit of cable-terminating and connecting hardware. Where similar jacks and plugs are used for both voice and data communication cabling, use a different color for jacks and plugs of each service.

3.8 FIELD QUALITY CONTROL

A. Tests and Inspections:

2. Visually confirm Category 6 marking of outlets, cover plates, outlet/sockets, and patch panels.
3. Visually inspect cable placement, cable termination, grounding and bonding, equipment and patch cords, and labeling of all components.
4. Test UTP backbone copper cabling for DC loop resistance, shorts, opens, intermittent faults, and polarity between conductors. Test operation of shorting bars in connection blocks. Test cables after termination but not cross-connection.
   a. Test instruments shall meet or exceed applicable requirements in TIA/EIA-568-B.2. Perform tests with a tester that complies with performance requirements in "Test Instruments (Normative)" Annex, complying with measurement accuracy specified in "Measurement Accuracy (Informative)" Annex. Use only test cords and adapters that are qualified by test equipment manufacturer for channel or link test configuration.

5. UTP Performance Tests:
   a. Test for each outlet and MUTOA. Perform the following tests according to TIA/EIA-568-B.1 and TIA/EIA-568-B.2:
      1) Wire map.
      2) Length (physical vs. electrical, and length requirements).
      3) Insertion loss.
      4) Near-end crosstalk (NEXT) loss.
      5) Power sum near-end crosstalk (PSNEXT) loss.
      6) Equal-level far-end crosstalk (ELFEXT).
      7) Power sum equal-level far-end crosstalk (PSELFEXT).
      8) Return loss.
      9) Propagation delay.
     10) Delay skew.
6. Final Verification Tests: Perform verification tests for UTP systems after the complete communications cabling and workstation outlet/connectors are installed.

   a. Voice Tests: These tests assume that dial tone service has been installed. Connect to the network interface device at the demarcation point. Go off-hook and listen and receive a dial tone. If a test number is available, make and receive a local, long distance, and digital subscription line telephone call.

   b. Data Tests: These tests assume the Information Technology Staff has a network installed and is available to assist with testing. Connect to the network interface device at the demarcation point. Log onto the network to ensure proper connection to the network.

B. Document data for each measurement. Data for submittals shall be printed in a summary report that is formatted similar to Table 10.1 in BICSI TDMM, or transferred from the instrument to the computer, saved as text files, and printed and submitted.

C. Prepare test and inspection reports.

3.9 DEMONSTRATION

A. Engage a factory-authorized service representative to train Owner’s maintenance personnel in cable-plant management operations, including changing signal pathways for different workstations, rerouting signals in failed cables, and keeping records of cabling assignments and revisions when extending wiring to establish new workstation outlets.

END OF SECTION
SECTION 16835
CABLE TELEVISION PREWIRING

PART 1 - GENERAL

1.1 SUMMARY

A. The contractor shall provide and install a complete and operational cable television (CATV) horizontal cabling system that shall correctly function with infrastructure provided by the local cable television company. The contractor shall verify equipment service requirements and locations.

B. Section Includes:
   1. Pathways.
   2. CATV cabling.
   3. Outlets.

1.2 Cable Company shall be Cox CATV.

1.3 All CATV cabling shall be in conduit, no exceptions.
   A. Conduit bends shall be 24” minimum.

1.4 HORIZONTAL CABLING DESCRIPTION

A. Provide RG6/U, #18 gage solid copper conductor with polyurethane insulation with 100% foil shield coverage plus drain and beige color vinyl jacket.
   1. Not more than 4dB loss per 100’ measured at VHF channel 13 (0-750MHz).
   2. Nominal impedance of 75ohms, loop resistance per 1000’ shall not exceed 40 ohms.
   3. Provide Belden #8228 (beige) or equal by Jerrold or CCS cable.

1.5 OUTLETS

A. Provide flush in wall, unless otherwise noted, with plaster ring, box with minimum 3 / 4” conduit and white cover plate with F connecer.

1.6 PERFORMANCE REQUIREMENTS

A. Provide a separate cable connection to each outlet.

B. Maximum cable runs shall be 250’

C. Tag all cables at both ends for identification
D. The contractor shall be responsible for obtaining all licenses and permits as required by the local “AHJ”.

E. The contractor shall warranty the entire systems function and performance as specified herein for a period of 15 years from the data of final acceptance.

1.7 SUBMITTALS

A. Product Data: For each type of product indicated.

B. Shop Drawings:
   1. System Labeling Schedules: Electronic and hard copy of labeling schedules, in format selected by Owner.
   2. Cabling administration drawings and printouts.

C. Maintenance data.

1.8 FIELD QUALITY CONTROL

A. Prepare test and inspection reports.

END OF SECTION
SECTION 16840

SECURITY SYSTEM

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

A. Drawings and general provisions of the contract, including General and Supplementary Conditions and Division 1 Specification sections, apply to this section.

1.02 GENERAL REQUIREMENTS

A. These specifications contain the functional and operational requirements for card readers for access control and motion sensor area detection.

B. It is the intent of these specifications to provide and install a fully acceptable, effective and reliable security system. These specifications recognize the importance of complete system operation and are not limited to specifying of equipment only. The following are also required from the selected bidder:

1. Proven experience in the security business.
2. Prompt delivery and professional installation of equipment as specified.
4. Complete maintenance and service capability.

C. Bidder must provide, for objective evaluation, references which clearly state and show the effectiveness of proposed equipment and services.

D. All equipment described herein shall be the product of one manufacturer or products approved as compatible by the manufacturer. Used products will not be acceptable. Manufacturer must satisfactorily demonstrate that they have supplied and will continue to supply products to avoid the obsolescence of equipment installed in the building.

E. All cable shall be installed in conduit as specified in Section 16400.

F. Bidder shall show satisfactory evidence that he maintains as an integral part of his organization, and under his control, a fully equipped service department capable of providing timely maintenance and factory-authorized service as required with on-going replacement parts.

G. All equipment shall be fully guaranteed. This guarantee shall become effective from the day of installation. When in normal operation, if the equipment is found to be below manufacturers’ specification, repair and replacement of equipment shall be provided. Repairs shall be started within twenty-four hours and completed without delay. Bidder shall either stock spares or be capable of obtaining all required replacement parts within 24 hours.

H. Equipment damaged by vandalism, acts of God, building occupants, or stolen during hours when building is occupied, shall be replaced or repaired at client request and expense within twenty-four (24) hours.
I. All the work within the scope of this bid shall be performed in accordance with the applicable state, county and city laws and ordinances. The bidder shall be able to obtain all permits and licenses as required in addition to being a licensed contractor licensed. All materials, supplies and equipment must meet OSHA standards. All electrical wiring and installations shall be done in accordance with the California Electrical Code.

1.03 SCOPE
   A. The functional requirements define the owner equipment and operation procedures for a fully functional card reader access control system.
   B. The equipment consists of a U.L. Listed access control panel, access control card readers, to include door(s) low voltage interconnection release equipment connections.
   C. The system shall be fully functional to include all of the manufacturers recommended cabling, mounting hardware, power supplies, battery back-up 12 volt dc batteries, back boxes, racks, and any miscellaneous required hardware for a fully functional system(s).
   D. Provide complete shop drawings for approval, prior to installation, delineating the entire, fully functional card reader access systems.

1.04 ACCESS CONTROL SYSTEM
   A. Provide and install a GENERAL ELECTRONICS or approved equal access control panel model #ACU2XL-16-A2B0136752 or equal with ACU2XI/16 or equal Network Intelligent Controller Board with Lan/Wan Port, 8 amp power supply, 10,000 card capacity, 16 reader capability, in standard enclosure in room #131.
   B. Provide and install a ESD lock power supply unit model #ESD-SPS-20EL or equal in room #131.
   C. Provide and install a HID05455 Prox Pro card reader or equal at location per plans.
   D. Provide and install one (1) GENERAL ELECTRONICS remote reader electronics model #GE-RRE-1 or equal in accessible ceiling at each card reader.

1.05 PERSONNEL
   A. The service provider shall have qualified and certified personnel on staff to provide the highest level of service during the term of the contract. The following will be the minimum requirements.

1.06 INSTALLATION/SERVICE
   A. Shall have a minimum of one technician on permanent staff that has attended and has been certified by an approved training seminar by the manufacturer dealing with the U.L. installation procedures and service/maintenance of the installed video surveillance and access control system.

1.07 COMMUNICATION REQUIREMENTS
   A. The access control panel shall remote contact capabilities to upload/download access control
activity or to modify operating characteristics or options.

B. The access control panel shall reliably operate over the telephone company's switched network.

END OF SECTION
SECTION 16850
TELEPHONE SYSTEM ROUGH-IN

PART 1 - GENERAL

1.1 SUMMARY

A. The telephone equipment and cabling shall be provided by the owner.

B. Section Includes:
   1. Pathways.
   2. Outlets.

1.2 Telephone Company shall be AT&T Telephone.

1.3 All telephone cabling shall be in conduit, no exceptions. See raceways and boxes for requirements.

A. Conduit bends shall be 12” minimum for ¾” and 1” conduits; 12” minimum for 1-1/4” conduits.

1.4 Definitions:

1. Telephone Company Means “AT&T”.
2. Owner means “County of San Diego”.
3. “Voice” refers to telephone system.

1.5 OUTLETS

1. Wall outlet boxes shall be of size and type to suit each individual location. Minimum box size shall be 4-11/16” square by 2-1/8” deep with or without plaster rings as necessary, and cover plates with a square jack opening or a round bushed opening shall be provided at each telephone outlet location. Cover plate opening shall be as required by telephone company. Plate material and finish shall conform to receptacle device plate requirements.

2. Wall outlet configurations shall be as follows. Verify wall outlet requirements with Owner prior to ordering.

3. Voice (wall telephone) outlets: Jack assemblies shall be a single 8-position Western Electric (WECo) non-keyed jack.

1.6 Data Outlets:

4. Provide per Structured Cabling Section.

1.7 Combination Telephone/Data Outlet:

1. Duplex outlet with one telephone outlet and one data outlet as described above.
1.8 TERMINATIONS

1. Terminate telephone branch conduits and conduit sleeves with bushings. Terminate service conduits as directed by Telephone Company.

2. Conduits for Voice outlets shall be 3/4” minimum and terminate in the tele/data room.

3. Conduits for Data outlets shall be 3/4” minimum and terminate in the tele/data room.

2.0 SUBMITTALS

A.

2. Product Data: For each type of product indicated.

3. Shop Drawings:

END OF SECTION
SECTION 16860
PUBLIC ADDRESS SYSTEMS

PART 1 - GENERAL

1.1 SUMMARY

A. The contractor shall provide and install a complete and operational public address. The contractor shall verify equipment service requirements and locations.

B. Section Includes:
   1. Speakers.
   2. Volume Control.
   4. Pre-amplifier.
   5. Power Amplifier.
   6. Conductors and cables.
   7. Raceways.

1.2 SUBMITTALS

A. Product Data: For each type of product indicated.

B. Operation and maintenance data.

1.3 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. Comply with NFPA 70.

PART 2 - PRODUCTS

2.1 Speakers

A. Wall Mounted:
   1. Wall mounted apparatus room and exterior speakers shall be Soundolier AP-15T, or equal.

B. Indoor Reccessed:
   1. Rauland-Borg Corporation, provide 8” round speaker with white grill and recessed enclosure. Rauland model USO-188 with ACC1001 Baffle, model acc1101 backbox and model 1104 T-bar bridge or qpproved equal. Speakers located in shower room shall be waterproof.
C. Volume Control:
   1. The Area Speaker Volume Control shall be a Rauland Model ACC1300 or approved equal, mounted to a single-gang brushed stainless steel wall plate. The unit shall provide control of area speaker volume on 25-volt or 70-volt speaker distribution lines supplying up to 10 watts of audio power. The unit shall have two 6dB steps for the first two positions and eight 3dB for the third through tenth positions. The power rating shall be 10 watts, and the attenuation range shall be 36dB. There shall be no stop between position 10 and position "0" (off). The switch shall have silver-plated contacts. The insertion loss shall be .5dB or less.

2.2 GENERAL EQUIPMENT AND MATERIAL REQUIREMENTS

A. Compatibility of Components: Coordinate component features to form an integrated system. Match components and interconnections for optimum performance of specified functions.

B. Equipment: Comply with UL 813. Equipment shall be modular, using solid-state components, and fully rated for continuous duty unless otherwise indicated. Select equipment for normal operation on input power usually supplied at 110 to 130 V, 60 Hz.

C. Weather-Resistant Equipment: Listed and labeled by a qualified testing agency for duty outdoors or in damp locations.

2.3 PREAMPLIFIERS

A. Preamplifier: Integral to power amplifier.

B. Output Power: Plus 4 dB above 1 mW at matched power-amplifier load.

C. Total Harmonic Distortion: Less than 1 percent.

D. Frequency Response: Within plus or minus 2 dB from 20 to 20,000 Hz.

E. Input Jacks: Minimum of two. One matched for low-impedance microphone; the other matchable to cassette deck, CD player, or radio tuner signals without external adapters.

F. Minimum Noise Level: Minus 55 dB below rated output.

G. Controls: On-off, input levels, and master gain.

2.4 POWER AMPLIFIERS

A. Mounting: rack.

B. Output Power: 70-V balanced line. 70 percent of the sum of wattage settings of connected for each station and speaker connected in all-call mode of operation, plus an allowance for future stations.

C. Total Harmonic Distortion: Less than 3 percent at rated power output from 50 to 12,000 Hz.

E. Frequency Response: Within plus or minus 2 dB from 50 to 12,000 Hz.

F. Output Regulation: Less than 2 dB from full to no load.

G. Controls: On-off, input levels, and low-cut filter.

H. Input Sensitivity: Matched to preamplifier and to provide full-rated output with sound-pressure level of less than 10 dynes/sq. cm impinging on speaker microphone or handset transmitter.

I. Provide RJ jack type as specified by Alerting Vendor for alerting system input. Verify requirements with alerting system vendor.

2.5 MICROPHONES

A. Paging Microphone:
   1. Impedance: 150 ohms.
   2. Frequency Response: Uniform, 50 to 14,000 Hz.
   3. Output Level: Minus 58 dB, minimum.
   5. Cable: C25J.

2.6 OUTLETS

A. Microphone Outlet: Three-pole, polarized, locking-type, microphone receptacles in single-gang boxes. Equip wall outlets with brushed stainless-steel device plates. Equip floor outlets with gray tapered rubber or plastic cable nozzles and fixed outlet covers.

2.7 CONDUCTORS AND CABLES

A. Loudspeaker line shall be 18-gauge stranded, with PVC jacket.

B. Microphone line shall be two conductor 22-guage solid aluminum polyester shield with PVC jacket.

2.8 RACEWAYS

A. Conduit and Boxes: Comply with Division 16 Section "Raceway and Boxes for Electrical Systems."

PART 3 - EXECUTION

3.1 WIRING METHODS

A. Wiring Method: Install cables in raceways and cable trays.
3.2 INSTALLATION OF RACEWAYS

A. Comply with requirements in Division 16 Section "Raceway and Boxes for Electrical Systems" for installation of conduits and wireways.

B. Install manufactured conduit sweeps and long-radius elbows whenever possible.

3.3 INSTALLATION OF CABLES

A. Comply with NECA 1.

B. General Cable Installation Requirements:

1. Terminate conductors; no cable shall contain unterminated elements. Make terminations only at outlets and terminals.

2. Splices, Taps, and Terminations: Arrange on numbered terminal strips in junction, pull, and outlet boxes; terminal cabinets; and equipment enclosures. Cables may not be spliced.

3. Bundle, lace, and train conductors to terminal points without exceeding manufacturer's limitations on bending radii. Install lacing bars and distribution spools.

4. Do not install bruised, kinked, scored, deformed, or abraded cable. Do not splice cable between termination, tap, or junction points. Remove and discard cable if damaged during installation and replace it with new cable.

5. Cold-Weather Installation: Bring cable to room temperature before dereeling. Heat lamps shall not be used.

C. Separation of Wires: Separate speaker-microphone, line-level, speaker-level, and power wiring runs. Install in separate raceways or, where exposed or in same enclosure, separate conductors at least 12 inches (300 mm) apart for speaker microphones and adjacent parallel power and telephone wiring. Separate other intercommunication equipment conductors as recommended by equipment manufacturer.

3.4 INSTALLATION

A. Match input and output impedances and signal levels at signal interfaces. Provide matching networks where required.

B. Identification of Conductors and Cables: Color-code conductors and apply wire and cable marking tape to designate wires and cables so they identify media in coordination with system wiring diagrams.

C. Weatherproof Equipment: For units that are mounted outdoors, in damp locations, or where exposed to weather, install consistent with requirements of weatherproof rating.

D. Speaker-Line Matching Transformer Connections: Make initial connections using tap settings indicated on Drawings.

3.5 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. Schedule tests with at least seven days’ advance notice of test performance.
2. After installing public address and mass notification systems and after electrical circuitry has been energized, test for compliance with requirements.
3. Operational Test: Perform tests that include originating program and page messages at microphone outlets, preamplifier program inputs, and other inputs. Verify proper routing and volume levels and that system is free of noise and distortion.
4. Acoustic Coverage Test: Feed pink noise into system using octaves centered at 500 and 4000 Hz. Use sound-level meter with octave-band filters to measure level at five locations in each zone. For spaces with seated audiences, maximum permissible variation in level is plus or minus 2 dB. In addition, the levels between locations in same zone and between locations in adjacent zones must not vary more than plus or minus 3 dB.
5. Power Output Test: Measure electrical power output of each power amplifier at normal gain settings of 50, 1000, and 12,000 Hz. Maximum variation in power output at these frequencies must not exceed plus or minus 1 dB.

C. Inspection: Verify that units and controls are properly labeled and interconnecting wires and terminals are identified. Prepare a list of final tap settings of paging speaker-line matching transformers.

D. Public address and mass notification systems will be considered defective if they do not pass tests and inspections.

E. Prepare test and inspection reports.

1. Include a record of final speaker-line matching transformer-tap settings, and signal ground-resistance measurement certified by Installer.

END OF SECTION
SECTION 16870
VIDEO SURVEILLANCE

PART 1 - GENERAL

1.1 SUMMARY

A. Section includes a video surveillance system consisting of cameras, digital video recorder, data transmission wiring, and a control station with its associated equipment. The contractor shall provide and install a complete and operational Perimeter and Interior conference/interview surveillance system with head end systems as specified on the drawings and herein.

1.2 SUBMITTALS

A. Product Data: For each type of product indicated. Include dimensions and data on features, performance, electrical characteristics, ratings, and finishes.

B. Shop Drawings: For video surveillance. 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. Functional Block Diagram: Show single-line interconnections between components for signal transmission and control. Show cable types and sizes.
   3. Dimensioned plan and elevations of equipment racks, control panels, and consoles. Show access and workspace requirements.
   4. UPS: Sizing calculations.
   5. Wiring Diagrams: For power, signal, and control wiring.

C. Equipment List: Include every piece of equipment by model number, manufacturer, serial number, location, and date of original installation.

D. Seismic Qualification Certificates: For video surveillance, cameras, camera-supporting equipment, 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. 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.

E. Field quality-control reports.

F. Operation and maintenance data.
1.3 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. Comply with NECA 1.

C. Comply with NFPA 70.

D. Electronic data exchange between video surveillance system with an access-control system shall comply with SIA TVAC.

1.4 WARRANTY

A. Special Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace components of cameras, equipment related to camera operation, and control-station equipment that fail in materials or workmanship within specified warranty period.

1. Warranty Period: Three years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 SYSTEM REQUIREMENTS

A. Video-signal format shall comply with NTSC standard, composite interlaced video. Composite video-signal termination shall be 75 ohms.

B. Surge Protection: Protect components from voltage surges entering through power, communication, signal, control, or sensing leads. Include surge protection for external wiring of each conductor's entry connection to components.

1. Minimum Protection for Power Connections 120 V and More: Auxiliary panel suppressors complying with requirements in Division 26 Section "Transient-Voltage Suppression for Low-Voltage Electrical Power Circuits."

2. Minimum Protection for Communication, Signal, Control, and Low-Voltage Power Connections: Comply with requirements in Division 26 Section "Transient-Voltage Suppression for Low-Voltage Electrical Power Circuits." as recommended by manufacturer for type of line being protected.

C. Tamper Protection: Tamper switches on enclosures, control units, pull boxes, junction boxes, cabinets, and other system components shall initiate a tamper-alarm signal when unit is opened or partially disassembled. Control-station, control-unit alarm display shall identify tamper alarms and indicate locations.

2.2 STANDARD CAMERAS

A. Provide and install cameras by Pelco or approved equal, refer to drawings for quantities and locations.
2.3 POWER SUPPLIES

A. Provide and install an ESD camera central power supply model #PDA-8ET4UL or approved equal in tele/data room.

   1. Enclosure: NEMA 250, Type 1.

2.4 DIGITAL VIDEO RECORDERS

A. Provide and install a VISION CONTROLS digital video recorder model #CAM XP-16/400R or approved equal IN rack mounted in tele/data room.

PART 3 - EXECUTION

3.1 WIRING

A. Comply with requirements in Section "Raceway and Boxes for Electrical Systems."

B. Wiring Method: Install cables in raceways unless otherwise indicated.

   1. Except raceways are not required in accessible indoor ceiling spaces and attics.
   2. Except raceways are not required in hollow gypsum board partitions.
   3. Conceal raceways and wiring except in unfinished spaces.

C. Wiring within Enclosures: Bundle, lace, and train conductors to terminal points with no excess and without exceeding manufacturer's limitations on bending radii. Provide and use lacing bars and distribution spools.

D. Splices, Taps, and Terminations: For power and control wiring, use numbered terminal strips in junction, pull, and outlet boxes; terminal cabinets; and equipment enclosures. Tighten electrical connectors and terminals according to manufacturer's published torque-tightening values. If manufacturer's torque values are not indicated, use those specified in UL 486A-486B.

E. Grounding: Provide independent-signal circuit grounding recommended in writing by manufacturer.

3.2 VIDEO SURVEILLANCE SYSTEM INSTALLATION

A. Install cameras with 84-inch- (2134-mm-) minimum clear space below cameras and their mountings. Change type of mounting to achieve required clearance.

B. Set pan-and-tilt unit stops to suit final camera position and to obtain the field of view required for camera. Connect all controls and alarms, and adjust.

C. Avoid ground loops by making ground connections only at the control station.

   1. For 12- and 24-V dc cameras, connect the coaxial cable shields only at the monitor end.

D. Identify system components, wiring, cabling, and terminals according to Section "Identification for Electrical Systems."
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. Inspection: Verify that units and controls are properly installed, connected, and labeled, and that interconnecting wires and terminals are identified.
   2. Operational Tests: Perform operational system tests to verify that system complies with Specifications. Include all modes of system operation.

C. Video surveillance system will be considered defective if it does not pass tests and inspections.

D. Prepare test and inspection reports.

3.4 DEMONSTRATION

A. Engage a factory-authorized service representative to train Owner's maintenance personnel to adjust, operate, and maintain video-surveillance equipment.

END OF SECTION
Contractor shall protect existing site features and shall repair or replace any damage that may be caused by contact with utility services.

The contractor shall enforce all safety measures. The contractor shall proceed with any work that is necessary to support the project.

The contractor shall be responsible for any damage that may be caused by the construction process. The contractor shall ensure that all equipment is properly secured and that all workers are properly trained and certified.

The contractor shall be responsible for maintaining all safety measures at the job site. The contractor shall ensure that all equipment is properly maintained and that all workers are properly trained and certified.

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4. ALL RAMPS TO BE FLAT OR CONTINUOUS, SURFACES TO BE NONSLIP.

5. THE GRAB BARS SHALL BE SECURED TO THE WALL AT A MINIMUM HEIGHT OF 30" ABOVE THE FLOOR OR LANDING.

6. THE HANDRAILS SHALL BE MOUNTED AT A MINIMUM HEIGHT OF 30" ABOVE THE FLOOR OR LANDING.

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31. THE HANDRAILS SHALL BE MOUNTED AT A MINIMUM HEIGHT OF 30" ABOVE THE FLOOR OR LANDING.
**SIGNAGE MEASUREMENTS**

**DISTANCE**
- Measured from the baseline of the lowest characters and their background to the baseline of the next line of raised characters.
- Measured as the horizontal distance between the character and an obstruction preventing further approach towards the sign.
- Measured as the horizontal distance between the character and a pictorial symbol or text shown.
- Measured from the top of the sign to the top of the highest line of raised characters.

**COLOR**
- Dark on a light background.

**CHARACTER STYLE**
- Maximum, uppercase sans serif.
- Minimum, uppercase sans serif.
- Letters 1/32" raised.
- Letters 1/32" minimum raised.
- Male female or other lettering other than " I " centered.
- Male female or other lettering other than " I " left justified or centered.

**MOUNTING LOCATION AND HEIGHT**
- Maximum, 60" above floor or ground.
- Minimum, 12" wide x 18" deep.

**PICTORIAL SYMBOLS**
- Pictograms shall have a field height of 6" minimum.
- Characters and their background shall have a non-glare finish.
- The background shall be color no.15090 in Federal Standard 595C.

**FOR OTHER SIGNAGE REQUIREMENTS**
- Reference 2016 CBC Sec. 11B-703.

**ACCESSIBILITY SIGNAGE**
- Tactile Exit Signs shall be required at the following locations:
  - Exit Stair Down
  - Exit Stair Up
  - Exit Route - 60" AFF

**SIGNAGE ACCESSIBILITY DETAILS**
- The International Standards of Accessibility shall consist of a 3" Raised (9.5MM) Minimun from the baseline to 60" Maximum, 21 Feet.

**NOTES**
- For other signage requirements reference 2016 CBC Sec. 11B-703.
- For additional identification signage required at the following locations:
  - Exit Route - 60" AFF
  - Exit Route - 120 Inches
  - Emergency Enclosure - 60" AFF

**COLOR TREND**
- Male female or other lettering other than " I " centered. Letters 1/32" raised.
NOTE 2: THE DETECTABLE WARNINGS SHALL CONTRAST VISUALLY WITH ADJOINING SURFACES, WHETHER LIGHT ON DARK OR DARK ON LIGHT. THE WIDTH OF THE LIGHTER AREA AND THE MAXIMUM WIDTH OF THE DARKER AREA SHALL NOT BE GREATER THAN 2.3" MINIMUM TO 2.4" MAXIMUM AND A BASE TO BASE SPACING OF 0.65" MINIMUM MEASURED BETWEEN THE TWO MOST ADJACENT DOMES.

NOTE 1: DETECTABLE WARNINGS SHALL CONSIST OF RAISED TRUNCATED DOMES WITH A BASE DIAMETER OF 0.18" - 0.22" H.T.


8. BARRIER HANDRAILS AND HANDRAIL EXTENSIONS

9. EV CHARGER SIGNAGE

10. ACCESSIBLE PAVING SIGNAGE

11. PARKING SPACE IDENTIFICATION SIGN Shall Be Inscribed On Each Parking Space With A Permanent, Heavy, Clearly Distinguishable Delineation To The Parking Space Or Accessible Daily Space Which Shall Be On Top Of And Not Overlaying The Accessible Stall Or Space Centerline.
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<tr>
<th>CalGreen Mandatory Measures Compliance Checklist</th>
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<tr>
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CONDITIONS OF APPROVAL

All applicable requirements and specifications for the Work set forth in the approved and final technical submittal(s) and drawings shall be codified and approved by the Contractor. The Contractor shall not commence work on the site or begin any construction or alterations on the site until approval of the Contract documents by the Owner and/or the Project Team. The Owner and/or the Project Team shall review and approve the drawings and specifications before the Contractor commences any work on the site.

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<td><a href="http://www.jeffkatzarchitecture.com">www.jeffkatzarchitecture.com</a></td>
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<td>6353 DEL CERRO BOULEVARD</td>
<td>SAN DIEGO, CA 92120</td>
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<tr>
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<td>T.14</td>
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<tr>
<td>FIRE STATION #41</td>
<td>COASTSIDE FIRE PROTECTION DISTRICT</td>
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Storm drain pollutants may be liable for fines of up to $10,000 per day!
**Project:**

**Description:**

**Date:**

**Project Number:**

**Sheet:**

**Drawn By:**

**Checked By:**

**Sheet Title:**

**Approved By:**

**Sheet Number:**

**NOT FOR CONSTRUCTION**

**www.jeffkatzarchitecture.com**

**BUILDING DEPARTMENT SUBMITTAL 08/24/17**

**BUILDING DEPARTMENT RESUBMITAL 12/15/17**

**BID SET 03/01/18**

**FIRE STATION #41**

**COASTSIDE FIRE PROTECTION DISTRICT**

**OBISPO ROAD**

**EL GRANADA, CA 94018**

**PK**

**PC**

**KN**

**CONSTRUCTION DETAILS**

**Description:**

**Date:**

**BID SET 05/24/18**

**NOT FOR CONSTRUCTION**

---

**1. FLUSH CURB**

**2. 24" CURB OPENING**

**3. STORM DRAIN CLEANOUT**

**4. DROP INLET / JUNCTION BOX**

**5. BUBBLER BOX ASSEMBLY**

**6. BIRETENTION BASIN**
GENERAL NOTES:

1. The drawings and specifications are subject to change due to the standards, state laws and regulations, and the decision of the architect of record. All materials, labor, and equipment shall be in accordance with the plans and specifications. The contractor shall be responsible for any changes or modifications not in accordance with the plans and specifications.

2. The contractor shall coordinate all work, including subcontractors' work, with the architect of record to ensure the proper coordination of all systems and materials. The contractor shall be responsible for any changes or modifications not in accordance with the plans and specifications.

3. The contractor shall provide all necessary tools and equipment to the site and shall be responsible for the proper use and care of all tools and equipment.

4. The contractor shall provide all necessary tools and equipment to the site and shall be responsible for the proper use and care of all tools and equipment.

5. The contractor shall coordinate all work, including subcontractors' work, with the architect of record to ensure the proper coordination of all systems and materials. The contractor shall be responsible for any changes or modifications not in accordance with the plans and specifications.

LANDSCAPE SHEET INDEX

1.1.1 LANDSCAPE GENERAL NOTES
1.1.2 SITE PLAN
1.1.3 PLANT LIST
1.1.4 PLANT MATERIALS
1.1.5 PLANTING DIRECTIONS
1.1.6 PLANTING DETAILS
1.1.7 PLANTING PLANS
1.1.8 INSTALLATION DIRECTIONS
1.1.9 INSTALLATION PLANS
1.1.10 INSTALLATION DETAILS
IRRIGATION LEGEND

- SHORT-TERM WEATHER-BASED IRRIGATION CONTROL SYSTEM
- HURREN:\n  HARDENED FLOOR EMBLEMS, LOCATIONS PER PLANT

MASTER VALVE
- UNTHRED MEDiators VALVE normally OPEN (LINE SIZE)
- FLOW FOR DEVICES
- POP-UP 4" ORDNANTCHE PVC
- LATERAL ESCH PVC 4" AND LARGER, 2" SDDING
- ELEVR\N CLS PVC PVC SIZE AS SHOWN
- FLUSH VALVE
- STANDALONE ASSEMBLY BOLTED, PER DETAIL

DEVICES CONTROL VALVES IN PRESSURE REGULATION FA ZAIRE
- DENSITY, A DRY, FULL, O MOISTURE CONTENTS
- CONTROL VALVES

CONTROLLER & STATION NUMBER
- VALve SINE (BIVALENT)
- POP-UP STAIRSTEP (STAIR) IN ADJUSTABLE AND A CHECK VALVE
- MODEL "STAIRSTEP 2" OR "STAIRSTEP 3"
- SELECT MODELS: RAINFLOW BOLT & WASH

- POP-UP SPRAY HEAD WITH ADJUSTABLE OR MATCHED PRESET VOLUME RATE, CLOSURE VALVE \N PRECISION REGULATION.
- MOTORS, PUMP, WATER TANK, \N WATER SUPPLY, \N SYSTEM PRESSURE REGULATION \N (WATER SUPPLY), \N ELECTRIC SYSTEM \N (WATER SYSTEM)
- ON SURFACE DULET
- SPACING DUE TO THE NEAR SPACING BY RANKED OR APPRECIATED EQUAL.

TEMPERATURE INDICATION
- TEMPERATURE IN FIGURES (TEMP) IS APPRECIATED FOR TEMPORARY EXTENDED OR HOVERED...

IRRIGATION NOTES & LEGEND

1. **WATER USE CALCULATIONS**

   **HYDROGRAPHY TABLE**

<table>
<thead>
<tr>
<th>Eto</th>
<th>G</th>
<th>Q</th>
<th>L</th>
<th>D</th>
<th>M</th>
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<tr>
<td>0.5</td>
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</table>

   **ESTIMATED WATER USE (ETo)**

   

2. **MAXIMUM ALLOWED WATER ALLOCATION (WMA)**

   WMA = ETO x 0.85 x 2.05


3. **ESTIMATED TOTAL WATER USE (ETo)**

   ETo = WMA x 1.2

4. **IRRIGATION NOTES**

   - Refer to plans, details, and specifications for irrigation system components, installation, maintenance, and repair requirements.
   - The contractor shall comply with all local/state permits and requirements, all City of San Antonio regulations, and the City of San Antonio Utilities Ordinance. Changes to the irrigation design, even if approved, may not be made without written permission from the City of San Antonio Utilities Department.
   - Chevron is responsible for the entire system, including the irrigation system components and all related equipment and materials. The contractor shall be responsible for all necessary permits, including those required by the City of San Antonio Utilities Department. The contractor shall be responsible for all costs associated with the installation of the irrigation system components.
   - The contractor shall be responsible for all necessary permits, including those required by the City of San Antonio Utilities Department. The contractor shall be responsible for all costs associated with the installation of the irrigation system components.

5. **IRRIGATION SYSTEM**

   - The irrigation system shall consist of a complete irrigation system, including all necessary components, accessories, and materials as required by the City of San Antonio Utilities Department. The contractor shall be responsible for all necessary permits, including those required by the City of San Antonio Utilities Department. The contractor shall be responsible for all costs associated with the installation of the irrigation system components.

6. **IRRIGATION LEGEND**

   - Short-term weather-based irrigation controller system
   - Hardened floor emblems, locations per plant

   - Master valve
   - Unthreaded mediators valve, normally open (line size)
   - Flow for devices
   - Pop-up 4" ordnantche PVC
   - Lateral esch PVC 4" and larger, 2" sdding
   - Elevan cln PVC PVC size as shown
   - Flush valve
   - Standalone assembly bolted, per detail

   - Devices control valves in pressure regulation fa zaire
density, a dry, full, or moisture contents

   - Controller & station number
   - Valve sine (bivalent)

   - Pop-up stairstep (stair) in adjustable and a check valve
   - Model "stairstep 2" or "stairstep 3"
   - Select models: rainflow bolt & wash

   - Pop-up spray head with adjustable or matched preset volume rate, closure valve & precision regulation.
   - Motors, pump, water tank, water supply, electric system, water system

   - On surface delet
   - Spacing due to the near spacing by ranked or appreciated equal.

   - Temperature indication
   - Temperature in figures (temp) is appreciated for temporary extended or hovered.
4. Drip tubing on grade installation

5. Linear drip tubing layout

6. Drip operation indicator

7. Air vacuum relief valve

8. Sprinkler pop-up

NOTES:
- For construction purposes, please review the specifications and details provided by the manufacturer.
- Ensure all installation meets local and state regulations.
- Installation should be performed by a licensed contractor.
- Regular maintenance is required to ensure proper functioning.

BID SET 05/24/18
THE C-1 ZONING DISTRICT ALLOWS FOR MIXED USE DEVELOPMENT (I.E., COMMERCIAL AND RESIDENTIAL); THEREFORE, THE REQUIRED STANDARDS LISTED PROVIDE A RANGE OF MINIMUM SETBACK REQUIREMENTS.

<table>
<thead>
<tr>
<th>STANDARDS</th>
<th>TYP.</th>
<th>MIN. FRONT SETBACK</th>
<th>MIN. REAR SETBACK</th>
<th>MIN. LEFT SIDE SETBACK</th>
<th>MIN. RIGHT SIDE SETBACK</th>
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</thead>
<tbody>
<tr>
<td>NONE</td>
<td>5'</td>
<td>20' FT.</td>
<td>28' - 36' FT.</td>
<td>NONE PROPOSED</td>
<td>173' (LESS THAN 18 INCHES ABOVE GRADE)</td>
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</table>

SECTION 6500(B) OF THE ZONING REGULATIONS ALSO ALLOWS PUBLIC SERVICE USES AND BUILDINGS IN ANY ZONING DISTRICT SUBJECT TO THE ISSUANCE OF A USE PERMIT, WHICH THE APPLICANT IS SEEKING AS PART OF THIS APPLICATION.

NO DEVELOPMENT IS CURRENTLY PLANNED FOR PROPOSED PARCEL A UNDER THIS PROJECT. ANY FUTURE DEVELOPMENT ON THIS AREA OF LAND WOULD BE REQUIRED TO COMPLY WITH THE BELOW DEVELOPMENT STANDARDS.

1. AT ALL DOORWAYS, VERIFY SET LEVEL OF CONCRETE.
2. CONTRACTOR TO PROVIDE ALL REQUIRED VERTICAL AND HORIZONTAL CLEARANCES NECESSARY FOR ACCESSIBILITY.
3. FUEL EFFICIENT VEHICLE PARKING WILL BE PROVIDED IN ACCORDANCE WITH CGC SECTIONS 5.106.5.1 AND 5.106.5.2.
4. MINIMUM DISTANCE BETWEEN GENERATOR AND BUILDING WILL BE MAINTAINED.
5. FUEL TANK, FUEL EFFICIENT VEHICLE PARKING AND GENERATOR WILL BE SEPARATE ENCROACHMENT PERMIT FROM PUBLIC WORKS DEPARTMENT.
6. ALL WORK WITHIN PROPERTY LINES MUST BE IN ACCORDANCE WITH PLANS, PLANS AND SPECIFICATIONS FOR PROPERTY LINES.
7. ALL WORK BEYOND PROPERTY LINES REQUIRES A SEPARATE ENCROachment PERMIT FROM PUBLIC WORKS DEPARTMENT.
8. NO EXCAVATION SHALL HAVE A MAXIMUM SLOPE IN THE DIRECTION OF DRAINAGE.
9. ACCESSIBLE PATH OF TRAVEL, INTERSECTIONS, DIRECTIONS SHOWN ON PLAN, SEE CIVIL DRAWINGS.
10. ACCESSIBLE PATH OF TRAVEL, VERIFY TABLES SHOWN ON PLAN, SEE CIVIL DRAWINGS.
11. PERMIT TO CIVIL DRAWINGS FOR LOCATION OF-WAY SHALL NOT EXCEED 1.5% CROSS SLOPE AND SEPARATE ENCROACHMENT PERMIT FROM PUBLIC WORKS DEPARTMENT.
12. FUEL TANK, FUEL EFFICIENT VEHICLE PARKING AND GENERATOR WILL BE SEPARATE ENCROACHMENT PERMIT FROM PUBLIC WORKS DEPARTMENT.
13. CONTRACTOR TO PROVIDE ALL REQUIRED VERTICAL AND HORIZONTAL CLEARANCES NECESSARY FOR ACCESSIBILITY.
14. MINIMUM DISTANCE BETWEEN GENERATOR AND BUILDING WILL BE MAINTAINED.
15. FUEL EFFICIENT VEHICLE PARKING WILL BE PROVIDED IN ACCORDANCE WITH CGC SECTIONS 5.106.5.1 AND 5.106.5.2.
16. MINIMUM DISTANCE BETWEEN GENERATOR AND BUILDING WILL BE MAINTAINED.
17. CONTRACTOR TO PROVIDE ALL REQUIRED VERTICAL AND HORIZONTAL CLEARANCES NECESSARY FOR ACCESSIBILITY.
18. MINIMUM DISTANCE BETWEEN GENERATOR AND BUILDING WILL BE MAINTAINED.
19. FUEL EFFICIENT VEHICLE PARKING WILL BE PROVIDED IN ACCORDANCE WITH CGC SECTIONS 5.106.5.1 AND 5.106.5.2.
20. MINIMUM DISTANCE BETWEEN GENERATOR AND BUILDING WILL BE MAINTAINED.
058 VAN ACCESSIBLE PARKING SPACE, SEE D1/T-7 107 4" WIDE STRIPING 108 6" CONCRETE CURB 109 SLIDING GATE OPERATOR, PER ... SECURITY GATE 330 V-TRACK FOR ROLLING SECURITY GATE 347 GALVANIZED STRUCTURAL STEEL COLUMN, REFERENCE STRUCTURAL DRAWINGS
1. CONTRACTOR SHALL VERIFY DIMENSIONS AND LAYOUT FOR ALL FIXTURES AND EQUIPMENT WITH ARCHITECT PRIOR TO ROUGH IN. REQUEST CLARIFICATION FOR ANY DIMENSIONS NOT SHOWN.

2. PROVIDE STAINLESS STEEL ACCESS PANELS AS REQUIRED FOR MECHANICAL EQUIPMENT. REFER TO MECHANICAL DRAWINGS.

3. CONTRACTOR MAY, AT HIS OPTION, USE METAL STUD BOARD CEILINGS, CONTRACTOR TO SUBMIT CEILING BOARD TIGHT TO STRUCTURE, SEE FINISH SCHEDULE FOR TYPE 905 MECHANICAL FAN COIL UNIT, REFERENCE MECHANICAL DRAWINGS 952 MECHANICAL EQUIPMENT, REFERENCE MECHANICAL DRAWINGS 962 WATER PIPES/ VENTS, SEE PLUMBING DRAWINGS.

4. SEE ROOM FINISH SCHEDULE FOR CEILING HEIGHTS NOT DIMENSIONS SHOWN.

5. INSTALL R-30 BATT INSULATION ABOVE ALL CEILING S IN ROOF R-SPACE.

6. SUSPENDED CEILING SHALL COMPLY WITH CBC. SEE 48 BUILDING CODE.

7. EXIT SIGNS SHALL BE READILY VISIBLE FROM ANY EXIT OF BUILDING TO THE NEAREST VISIBLE SIGN. SEE 48 BUILDING CODE. CLEARLY INDICATE THE DIRECTION OF EGRESS TRAVEL.

NOTE:

- PROVIDE FOUR 24"X24" RETURN AIR DIFFUSERS PER ROOM.
- PROVIDE TWO 24"X24" SUPPLY AIR DIFFUSERS PER ROOM.
- PROVIDE EMERGENCY 1'X4' LIGHT FIXTURE PER EXIT BETWEEN 6' AND 12' OF ALL FIXTURES AND EQUIPMENT.
- PROVIDE EMERGENCY 2'X4' PENDANT LIGHT FIXTURE PER EXIT BETWEEN 6' AND 12' OF ALL FIXTURES AND EQUIPMENT.
- PROVIDE 48"X48" CEILING FAN FOR HALLWAY AIR EXCHANGE.

KEYNOTES:

- BC = BUILDING CODE.
- E/F = EXTRACT / FUMIGATION
- G = GYPSUM BOARD CEILING
- H = HOSE SHUT-OFF VALVE
- I = INLET
- J = JUNCTION
- K = KITCHEN
- L = LAUNDRY
- M = MEETING
- N = MEETING
guest
- O = OFFICE
- P = PENDANT LIGHT FIXTURE
- Q = PORTABLE STAIRS
- R = 48"X48" CEILING FAN
- S = SERVICE AREA
- T = TURNOUTS
- U = UNIT WALL
- V = VENTILATION
- W = WORKSHOP
- X = EXIT BEAR WALL
- Y = EXTRACTOR/ FUMIGATOR/ "CLEANING"
- Z = ZONE NOT EXTRACTED
NOTE:
1. ALL ROOF COVERINGS SHALL HAVE A CLASS A FIRE RATING.
2. EXPOSED VALLEY FLASHINGS SHALL BE AT LEAST 24 GAUGE CORROSION-RESISTANT METAL INSTALLED OVER A MINIMUM 36" WIDE UNDERLAYMENT CONSISTING OF ONE LAYER OF 72 ASTM CAP SHEET RUNNING THE FULL LENGTH OF THE VALLEY.
3. REFER TO MECHANICAL, PLUMBING, AND ELECTRICAL DRAWINGS FOR THE LOCATIONS OF EQUIPMENT, VENTS, DUCTS, ETC.
4. FOIL-FACED BATT INSULATION R-30 AT ROOF CAVITY.
5. ALL ATTIC VENTS SHALL RESIST THE INTRUSION OF FLAMES AND EMBERS OR SHALL BE PROTECTED BY LOUVERS AND 1/8" NON-COMBUSTIBLE CORROSION-RESISTANT MESH TURBINE ATTIC VENTS, WHICH SHALL BE EQUIPPED TO ALLOW ROTATION IN ONE DIRECTION ONLY.
6. DUCT PENETRATIONS THROUGH TILE ROOF - SEE DETAIL B3 / A7.1 AND MECHANICAL DWGS.
7. CONDUIT PENETRATIONS THROUGH TILE ROOF - SEE DETAIL B4 / A7.1 AND MECHANICAL DWGS.
8. MEMBRANE ROOFING TO WRAP UP PARAPET WALL A MIN. OF 8" ABOVE HIGHEST POINT OF CRICKET, TYP.
9. VAPOR BARRIER WILL BE PROVIDED ON WARM-IN-WINTER SIDE OF ATTIC INSULATION TO QUALIFY FOR 1/300 ATTIC VENTING.
NOTE:
1. REFER TO DETAIL A1/A7.6 FOR ALL CURBS, U.N.O. CONCRETE CURB, VARIES - SEE DETAILS RAISED CONCRETE PAD FOR WASHER AND DRYER DEPRESSED SLAB - SEE STRUCTURAL DRAWINGS

SLAB LEGEND
- CONCRETE CURB, VARIES - SEE DETAIL
- EXPRESSED CURB, STRUCTURAL SHOWN
- RAISED CONCRETE PAD FOR WASHER AND DRYER

CURB PLAN

DESIGN SERVICES
BY JEFF KATZ, AIA
OBISPO ROAD
EL GRANADA, CA 94018

SCHEDULE
MAY 24, 2018
CURB PLAN
150202
A2.5

NOTES:
224 DEPRESSED CONCRETE SLAB - REFERENCE STRUCTURAL DRAWINGS
771 DEPRESSED SLAB FOR SHOWER TILE FLOOR, SEE DETAIL SHEETS
772 DEPRESSED SLAB FOR WALK OF MAT, SEE FLOOR FINISH PLAN AND FINISH SCHEDULE

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KEYNOTES:

- FOR FLOOR FINISH PLAN SEE A2.9
- SEE A2.2 FOR DIMENSION PLAN
- SEE ENLARGED PLANS FOR ADDITIONAL INFORMATION
- SEE SHEET A2.3 FOR REFLECTED CEILING PLAN
- SEE A6.2 FOR DOOR/WINDOW SCHEDULES
- SEE SHEET A4.6 FOR WALL TYPES

WALL LEGEND

- CMU 8" WALL
- CMU 16" PILASTER, SEE STRUCTURAL
- 2x4 STUD WALL
- 2x6 STUD WALL 1 HR RATED
- 12" CONCRETE WALL
- 2x6 STUD WALL 30 MIN RATED

NOTES:

1. FOR FLOOR FINISH PLAN SEE A2.9
2. SEE A2.2 FOR DIMENSION PLAN
3. SEE ENLARGED PLANS FOR ADDITIONAL INFORMATION
4. SEE SHEET A2.3 FOR REFLECTED CEILING PLAN
5. SEE A6.2 FOR DOOR/WINDOW SCHEDULES
6. SEE SHEET A4.6 FOR WALL TYPES
LENDER COLUMN STRUCTURE

BOTTOM COLUMN STRUCTURE

TOP COLUMN STRUCTURE

TRELLIS PLAN

KEYNOTES

038 WALL AS SCHEDULED 273 MANUFACTURED STONE VENEER OVER MORTAR SETTING BED, OVER MORTAR SCRATCH COAT, OVER METAL LATH, 2 LAYERS WATERPROOF MEMBRANE 864 WATER RESISTIVE BARRIER 879 1 1/2" X 1/2" GALV. ZEE CLOSURE 892 SELF ADHESIVE WATERPROOF MEMBRANE
LEVEL 1
0' - 0"

LEVEL 1
0' - 0"

8
4
6
2
5
3

ELEC
FITNESS
LAB
WORKSHOP
HOSE
TURNOUTS
EXTRACT / EXHAUST
RA COMP
STOR
STOR
STOR

NOTE:
1. NOTES AND DETAILS INDICATED AS TYPICAL APPLY TO ALL SECTIONS, U.O.N.

2. FOR FINISH SCHEDULE SEE SHEET A6.3
KEYNOTES:

- SPEC FORMLINER FORMED FINISH
- SITE FENCE OVER RETAINING WALL
- RETAINING WALL, REFERENCE STRUCTURAL DRAWINGS
- SLOW BATT INSULATION, TYP.
- CEMENTITIOUS FIBERBOARD SOFFIT
- LIQUID APPLIED WATERPROOFING

SCALE: 3/4" = 1'-0"
WALL 1A - HAS CEMENTITIOUS FIBERBOARD SIDING OVER 1/2" PLYWOOD SHEATHING, REFERENCE STRUCTURAL ASSEMBLY U305.

WALL 1B - IS A 16" CMU PILASTER, SEE 8" CMU WALL.

WALL 1C - HAS CEMENTITIOUS FIBERBOARD SIDING; WATER RESISTIVE BARRIER; CONCRETE TRIM.

WALL 1D - HAS 2X6 WOOD STUD, OVER (2) LAYERS OF MORTAR SCRATCH COAT, OVER FOIL FACED INSULATION.

WALL 1E - HAS 5/8" TYPE "X" SOUND DAMPENING GYP BOARD EACH SIDE FOR A 1 HOUR FIRE RATING PER UL ASSEMBLY U305 (REFERENCE STRUCTURAL) FOR A 1 HOUR FIRE RATING PER UL ASSEMBLY U305.

WALL 1F - HAS CERAMIC TILE OVER 5/8" TILE BACKER BOARD ON ONE SIDE ONLY, AND 5/8" TYPE "X" GYP BOARD ON OTHER SIDE.

WALL 1G - HAS 5/8" TYPE "X" GYP BOARD EACH SIDE FOR A 1 HOUR FIRE RATING ASSEMBLY PER UL.

WALL 1H - HAS 5/8" TYPE "X" SOUND DAMPENING GYP BOARD EACH SIDE AND PLYWOOD ON ONE SIDE ONLY (REFERENCE STRUCTURAL).

WALL 1I - HAS CEMENTITIOUS FIBERBOARD SIDING OVER 1/2" PLYWOOD SHEATHING OVER 1" AIR GAP WHERE CURB OCCURS - SEE FINISH SCHEDULE.

WALL 1J - HAS 5/8" TYPE "X" GYP BOARD EACH SIDE AND FRP WAINSCOT UP TO 48" AFF FOR A 1 HOUR FIRE RATING.

WALL 1K - HAS 5/8" TYPE "X" GYP BOARD EACH SIDE AND CERAMIC TILE OVER 5/8" TYPE"X" TILE BACKER BOARD.

WALL 1L - HAS 5/8" TYPE "X" GYP BOARD EACH SIDE AND PLYWOOD ON ONE SIDE ONLY.

WALL 1M - HAS 5/8" TYPE "X" SOUND DAMPENING GYP BOARD EACH SIDE, AND CERAMIC TILE OVER 5/8" TYPE"X" TILE BACKER BOARD.

WALL 1N - HAS 5/8" TYPE "X" GYP BOARD EACH SIDE AND FRP WAINSCOT UP TO 48" AFF FOR A 1 HOUR FIRE RATING.

WALL 1O - HAS 5/8" TYPE "X" GYP BOARD EACH SIDE AND FRP WAINSCOT OVER 1/2" PLYWOOD SHEATHING OVER 1" AIR GAP WHERE CURB OCCURS - SEE FINISH SCHEDULE.

WALL 1P - HAS 5/8" TYPE "X" GYP BOARD EACH SIDE AND CERAMIC TILE OVER 5/8" TYPE"X" TILE BACKER BOARD.

WALL 1Q - HAS 5/8" TYPE "X" GYP BOARD EACH SIDE AND PLYWOOD ON ONE SIDE ONLY.

WALL 1R - HAS 5/8" TYPE "X" SOUND DAMPENING GYP BOARD EACH SIDE, AND CERAMIC TILE OVER 5/8" TYPE"X" TILE BACKER BOARD.

WALL 1S - HAS 5/8" TYPE "X" GYP BOARD EACH SIDE AND FRP WAINSCOT UP TO 48" AFF FOR A 1 HOUR FIRE RATING.

WALL 1T - HAS 5/8" TYPE "X" GYP BOARD EACH SIDE AND PLYWOOD ON ONE SIDE ONLY.

WALL 1U - HAS 5/8" TYPE "X" SOUND DAMPENING GYP BOARD EACH SIDE, AND CERAMIC TILE OVER 5/8" TYPE"X" TILE BACKER BOARD.

WALL 1V - HAS 5/8" TYPE "X" GYP BOARD EACH SIDE AND FRP WAINSCOT UP TO 48" AFF FOR A 1 HOUR FIRE RATING.

WALL 1W - HAS 5/8" TYPE "X" SOUND DAMPENING GYP BOARD EACH SIDE, AND CERAMIC TILE OVER 5/8" TYPE"X" TILE BACKER BOARD.

WALL 1X - HAS 5/8" TYPE "X" GYP BOARD EACH SIDE AND CERAMIC TILE OVER 5/8" TYPE"X" TILE BACKER BOARD.

WALL 1Y - HAS 5/8" TYPE "X" SOUND DAMPENING GYP BOARD EACH SIDE, AND CERAMIC TILE OVER 5/8" TYPE"X" TILE BACKER BOARD.

WALL 1Z - HAS 5/8" TYPE "X" GYP BOARD EACH SIDE AND FRP WAINSCOT UP TO 48" AFF FOR A 1 HOUR FIRE RATING.
KEYNOTES:

1. FOR ADDITIONAL RESTROOM ACCESSIBILITY REQUIREMENTS, SEE SHEETS T-3 AND T-4.
2. FOR ADDITIONAL FINISH INFORMATION, SEE ROOM FINISH SCHEDULE A 6.1 AND INTERIOR DRAWINGS.
3. VERIFY LOCATION OF ALL STATION ALERTING EQUIPMENT WITH ARCHITECT PRIOR TO ROUGH IN.
4. INSTALL REINFORCEMENT IN THE WALLS SO AS TO PERMIT THE FUTURE INSTALLATION OF SHOWER SEAT AND GRAB BARS.

SCALE: 1/4" = 1'-0"
8'-5" 7'-5" 7'-7" 5'-0"
2'-3" 4'-2" 1'-1" 8'-6"
R.O. 3'-0" 1'-1" 8'-6" R.O. 3'-0"
6" R.O. 3'-0" 6" R.O. 3'-0"
3'-9" R.O. 3'-0" 3'-9" R.O. 3'-0"
10'-0" 5'-7" 10'-5"
2'-8" 7'-9" 14'-0" 14'-5"
7" 5'-0" 7'-10" 6'-3" 7'-10"
3'-11" 8'-5" 5'-7" 2'-8"
2'-10" 2'-10" 2'-0" 2'-10"
5'-7" 10'-0" 5'-7"
3'-9" R.O. 3'-0" 3'-9" R.O. 3'-0"
14'-0" 14'-5"
11'-11" 6'-3" 7'-10"
9'-0" TYP. 421 9'-0" TYP. 421
421 3'-0" TYP. 759 3'-0" TYP. 759
SSU 1 1 2 2 EQ 3'-6"
3'-0" TYP. 421 3'-0" TYP. 421
421 3'-0" TYP. 421 3'-0" TYP. 421
722 508 421 933
1 2 3 4 2'-10" 2'-10" 2'-10" 2'-10"
548 657 548 933
724 421 724 421
TYP. RB 1 TYP. RB 1 TYP. RB 1
TYP. PT 1 TYP. PT 1 TYP. PT 1
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933 548 933 548
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NOTES:
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3. VERIFY LOCATION OF ALL STATION ALERTING EQUIPMENT WITH ARCHITECT PRIOR TO ROUGH IN
4. INSTALL REINFORCEMENT IN THE WALLS SO AS TO PERMIT THE FUTURE INSTALLATION OF SHOWER SEAT AND GRAB BARS

KEYNOTES
080 SEMI RECESSED FIRE EXTINGUISHER AND CABINET
410 BI-FOLD DOOR STEEL FRAME BY MANUFACTURER
421 DOOR AND FRAME, MANUFACTURER
947 FIRE EXTINGUISHER, STEEL FOAM, BY MANUFACTURER, 30 LBS.
952 MECHANICAL EQUIPMENT, REFER TO MECHANICAL DRAWINGS
960 PLUMBING LINES, REFER TO PLUMBING DRAWINGS
676 MACHINERY, REFER TO MACHINERY DRAWINGS
943 MECHANICAL DUCT FRAME, REFER TO MECHANICAL DUCTS
952 MECHANICAL FAN, REFER TO MECHANICAL FAN SCHEDULE
400 AIR CONDITIONER, REFER TO AIR CONDITIONER SCHEDULE
947 FIRE EXTINGUISHER, WET PIPE, KL-80, 30 LBS.
960 PLUMBING LINES, REFER TO PLUMBING DRAWINGS
676 MACHINERY, REFER TO MACHINERY DRAWINGS
943 MECHANICAL DUCT FRAME, REFER TO MECHANICAL DUCTS
952 MECHANICAL FAN, REFER TO MECHANICAL FAN SCHEDULE
947 FIRE EXTINGUISHER, WET PIPE, KL-80, 30 LBS.
FOR ADDITIONAL FINISH INFORMATION, SEE ROOM FINISH SCHEDULE A & B AND INTERIOR DRAWINGS.

69. VERIFY LOCATION OF ALL EXTINGUISHING EQUIPMENT PIPES AND RELAY BOXES ON PHASE TWO.

70. INSTALL ALL LIGHTING FIXTURES IN THE WALLS SO AS TO FORM A 2'-0" HORIZONTAL GAP BETWEEN DRY WALL AND GLASS SHELVES.

71. INSTALL REINFORCEMENT IN THE WALLS SO AS TO PERMIT THE FUTURE INSTALLATION OF SHOWER SEAT AND GRAB BARS.

72. VERIFY LOCATION OF ALL STATION ALERTING EQUIPMENT WITH ARCHITECT PRIOR TO ROUGH IN.

73. INSTALL A 2'-0" GAP BETWEEN THE GLASS SHELVES AND THE WALLS.

74. INSTALL A 2'-0" GAP BETWEEN THE GLASS SHELVES AND THE WALLS.

NOTES:

1. FOR ADDITIONAL RESTROOM ACCESSIBILITY REQUIREMENTS, SEE SHEETS T-3 AND T-4.

2. FOR ADDITIONAL FINISH INFORMATION, SEE ROOM FINISH SCHEDULE A & INTERIOR DRAWINGS.

3. VERIFY LOCATION OF ALL STATION ALERTING EQUIPMENT WITH ARCHITECT PRIOR TO ROUGH IN.

4. INSTALL REINFORCEMENT IN THE WALLS SO AS TO PERMIT THE FUTURE INSTALLATION OF SHOWER SEAT AND GRAB BARS.

5. INSTALL A 2'-0" GAP BETWEEN THE GLASS SHELVES AND THE WALLS.

6. INSTALL A 2'-0" GAP BETWEEN THE GLASS SHELVES AND THE WALLS.

77. VERIFY LOCATION OF ALL EXTINGUISHING EQUIPMENT PIPES AND RELAY BOXES ON PHASE TWO.

78. INSTALL ALL LIGHTING FIXTURES IN THE WALLS SO AS TO FORM A 2'-0" HORIZONTAL GAP BETWEEN DRY WALL AND GLASS SHELVES.

79. INSTALL REINFORCEMENT IN THE WALLS SO AS TO PERMIT THE FUTURE INSTALLATION OF SHOWER SEAT AND GRAB BARS.

80. VERIFY LOCATION OF ALL STATION ALERTING EQUIPMENT WITH ARCHITECT PRIOR TO ROUGH IN.

81. INSTALL A 2'-0" GAP BETWEEN THE GLASS SHELVES AND THE WALLS.

82. INSTALL A 2'-0" GAP BETWEEN THE GLASS SHELVES AND THE WALLS.
KEYNOTES

1. FOR ADDITIONAL RESTROOM ACCESSIBILITY REQUIREMENTS, SEE SHEETS T-3 AND T-4
2. FOR ADDITIONAL FINISH INFORMATION, SEE ROOM FINISH SCHEDULE A 6.1 AND INTERIOR DRAWINGS
3. VERIFY LOCATION OF ALL STATION ALERTING EQUIPMENT WITH ARCHITECT PRIOR TO ROUGH IN
4. INSTALL REINFORCEMENT IN THE WALLS SO AS TO PERMIT THE FUTURE INSTALLATION OF SHOWER SEAT AND GRAB BARS

NOTES:

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2. FOR ADDITIONAL FINISH INFORMATION, SEE ROOM FINISH SCHEDULE A 6.1 AND INTERIOR DRAWINGS
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4. INSTALL REINFORCEMENT IN THE WALLS SO AS TO PERMIT THE FUTURE INSTALLATION OF SHOWER SEAT AND GRAB BARS
### Room Finish Schedule

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<tr>
<th>Room</th>
<th>Floor</th>
<th>Base</th>
<th>Wainscot</th>
<th>Walls</th>
<th>Ceiling</th>
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**Finish Notes**
- Paint finish: Eggshell
- Paint finish: Semi-gloss
- Provide stainless steel wall panels as indicated on interior elevations
- Provide 12" high rubber mat base
- Refer to interior elevations for additional information
- Provide high density concrete floor finish

---

**Material Legend**
- AC: Suspended Acoustic Ceiling Panels
- CNC: Carpet
- CPT: Concrete Masonry Unit
- CMU: Ceramic Tile
- EXP: Exposed Structure
- EL: Elastomeric Deck Coating
- GT: Gypsum Wall Board 5/8" UON
- GWB: Gypsum Wall Board
- GWBF: Gypsum Wall Board, Fire Resistant (5/8") Type-X
- GWBWR: Gypsum Wall Board, Water Resistant (5/8"
- PL: Plastic Laminate
- PT: Paint
- Plywd: 1/2" Plywood, Painted
- RB: Rubber Base
- RM: Rubber Mat
- SS: Stainless Steel
- SV: Stone Veneer
- VCT: Vinyl Composition Tile
- WD: Wood
- GWBWF: Gypsum Wall Board, Water/Fire Resistant Type-X (5/8"
- SSU: Solid Surface Countertop

---

**Project Information**
- Project: CFI-00401
- Project Location: OBISPO ROAD
- EL GRANADA, CA 94018
- Phone: 619.698.9177

**Company Information**
- www.jeffkatzarchitecture.com

---

**Sheet Information**
- Sheet: A6.1
- Project Number: 6353 DEL CERRO BOULEVARD | SAN DIEGO, CA 92120 | 619.698.9177
- Sheet Date: 05/24/18
1. TOILET ROOM IS A SIGNAGE AND TEXT ON WALL ADJACENT TO DOOR, SEE
2. PROVIDE ISA SYMBOL ON DOOR
3. 60 MINUTE RATED DOOR AND FRAME
4. PROVIDE SMOKE SEALS
5. PROVIDE TINTED 1/2" DUAL GLAZING
6. PROVIDE ROOM IDENTIFICATION SIGNAGE, VERIFY TEXT WITH OWNER
7. PROVIDE ACOUSTIC RATED DOOR
8. ALL FIRE RATED DOORS SHALL BE SELF OR AUTO-CLOSING, PER CBC 716.5.9
9. ADD LOUVERS TO LOWER PORTION OF DOOR(S), SEE MECHANICAL DRAWINGS FOR MIN. REQUIRED SIZING
10. UNDERCUT DOOR 3/4" MIN, SEE MECHANICAL DRAWINGS
11. SIGNAGE PROVIDED TO APPROACH SIDE: "TO BE USED BY SERVICE PERSONNEL ONLY"
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<th>TYPE</th>
<th>MANUFACTURER/DESCRIPTION</th>
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**FINISH SCHEDULE**

- **Project**: COASTSIDE FIRE PROTECTION DISTRICT
- **Date**: 05/24/18
- **Location**: EL GRANADA, CA 94018

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<td>STN</td>
<td>2</td>
<td>WOOD</td>
<td>HALEY ARCHITECTURAL DOORS</td>
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</tbody>
</table>
**DOOR DETAILS**

- **A7.3 A4 ROLLUP DOOR HEAD/SILL @ CMU WALL**
  - Scale: 1 1/2" = 1'-0"
- **A7.3 B4 ROLLUP DOOR JAMB @ CMU WALL**
  - Scale: 1 1/2" = 1'-0"
- **A7.3 D4 DOOR - KICK PLATE**
  - Scale: 6" = 1'-0"
- **A7.3 A3 BIFOLD DOOR HEAD**
  - Scale: 1 1/2" = 1'-0"
- **A7.3 B3 BI-FOLD DOOR JAMB**
  - Scale: 3" = 1'-0"
- **A7.3 A2 EXTERIOR WINDOW HEAD - FIXED @ CMU WALL**
  - Scale: 3" = 1'-0"
- **A7.3 B2 EXTERIOR WINDOW JAMB - FIXED @ CMU WALL**
  - Scale: 3" = 1'-0"
- **A7.3 C2 EXTERIOR WINDOW SILL - FIXED @ CMU WALL**
  - Scale: 3" = 1'-0"

**NOTES:**
- PROVIDE REMOVEABLE PLASTIC CAP OVER EXPANSION JOINT PRIOR TO POURING CONCRETE.
- MIN. REINFORCING SHALL BE #4 @ 24" O.C. EACH WAY.
- EXPANSION JOINTS NEED TO BE PLACED EVERY 20'.

**REINFORCING PER CIVIL DRAWINGS, OR AS NOTED**

- NOTE:
  - WATERPROOF MEMBRANE
  - EXPANSION JOINT
  - GLASS FIBER REINFORCED CONCRETE TRIM
  - INSIDE 1/2" PLYWOOD SHEATHING
  - MANUFACTURED STONE VENEER OVER MORTAR SETTING BED, OVER MORTAR SCRATCH COAT, OVER METAL LATH, OVER (2) LAYERS OF WATER RESISTIVE BARRIER
  - WATERPROOF MEMBRANE
MANUFACTURED STONE VENEER
OVER MORTAR SETTING BED, OVER
MORTAR SCRATCH COAT, OVER
METAL LATH, OVER (2) LAYERS OF
WATER RESISTIVE BARRIER
PLYWOOD SHEATHING, REFERENCE
STRUCTURAL DRAWINGS

GYPSUM WALL BOARD

CERAMIC TILE

FACE OF STUD

FACE OF STUD

CONCRETE CURB - SEE
STRUCTURAL DRAWINGS

CONCRETE PAVING, REFERENCE
CIVIL DRAWINGS

FLOORING AS OCCURS

WEEP SCREED

MANUFACTURED STONE VENEER
OVER MORTAR SETTING BED, OVER
MORTAR SCRATCH COAT, OVER
METAL LATH, OVER (2) LAYERS OF
WATER RESISTIVE BARRIER
PLYWOOD SHEATHING, REFERENCE
STRUCTURAL DRAWINGS

EXTERIOR GRADE, REFERENCE CIVIL
DRAWINGS

2"  6"

FACE OF STUD

FACE OF STUD

RUBBER BASE, TYP,

SLOPE GRADE 2% MIN

WEEP SCREED

FACE OF STUD

FACE OF STUD

RUBBER BASE, TYP,

SLOPE GRADE 2% MIN

WEEP SCREED

FACE OF STUD

FACE OF STUD

RUBBER BASE, TYP,

SLOPE GRADE 2% MIN

WEEP SCREED

FACE OF STUD

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SLOPE GRADE 2% MIN

WEEP SCREED

FACE OF STUD

FACE OF STUD

RUBBER BASE, TYP,

SLOPE GRADE 2% MIN

WEEP SCREED

FACE OF STUD

FACE OF STUD

RUBBER BASE, TYP,

SLOPE GRADE 2% MIN

WEEP SCREED

FACE OF STUD

FACE OF STUD

RUBBER BASE, TYP,
1. 1-HOUR OR 2-HOUR GYPSUM WALL ASSEMBLY TO INCLUDE:
   A. MIN. 1" TO MAX. 2" THICK GLASS-FIBER PIPE INSULATION
   B. MAX. 4" NOMINAL DIA. CAST OR DUCTILE IRON PIPE
   C. MAX. 3" NOMINAL DIA. COPPER PIPE OR TUBING
   D. MAX. 3" NOMINAL DIA. STEEL CONDUIT OR EMT
   E. MAX. 2" NOMINAL DIA. PVC PLASTIC PIPE
   F. MAX. 2" NOMINAL DIA. COPPER-PLATED COPPER PIPE
   G. MAX. 2" NOMINAL DIA. COPPER-PLATED COPPER-PLATED COPPER PIPE
   H. MAX. 2" NOMINAL DIA. COPPER-PLATED COPPER-PLATED COPPER PIPE

2. ONE OR MORE OF THE FOLLOWING PIPES, IN ANY COMBINATION MAY BE INSTALLED WITHIN THE OPENING:
   A. MIN. 1" TO MAX. 2" THICK GLASS-FIBER PIPE INSULATION
   B. MAX. 4" NOMINAL DIA. CAST OR DUCTILE IRON PIPE
   C. MAX. 3" NOMINAL DIA. COPPER PIPE OR TUBING
   D. MAX. 3" NOMINAL DIA. STEEL CONDUIT OR EMT
   E. MAX. 2" NOMINAL DIA. PVC PLASTIC PIPE
   F. MAX. 2" NOMINAL DIA. COPPER-PLATED COPPER PIPE
   G. MAX. 2" NOMINAL DIA. COPPER-PLATED COPPER-PLATED COPPER PIPE
   H. MAX. 2" NOMINAL DIA. COPPER-PLATED COPPER-PLATED COPPER PIPE

3. ANNULAR SPACE BETWEEN PENETRANTS = MIN. 1", MAX. 22".
MACHINE APPLIED NAILING:

LUMBER:

REQUIRED SPECIAL INSPECTIONS

NAILING SCHEDULE

TYPICAL STRUCTURAL NOTES

S1.1
TYPICAL SILL BOLT LAYOUT
TYP SCAB AT STUD OVER BOLT
TYPICAL WALL INTERSECTION - PLAN VIEW
TYPICAL LEDGER SPLICE
TYPICAL NAILED LEDGER DETAIL
TYPICAL HOLDOWN ANCHOR
TYPICAL NON-BEARING CONNECTION
TYP WELDED STUD AT STEEL COLL.
TYPICAL LEDGER AT CMU WALL ELEVATION
NOTES:
1. FOR DIMENSIONS NOT SHOWN, SEE ARCH.
2. FINISH FLOOR REFERENCE DATUM ELEVATION = 1'-0" U.O.
3. INTERIOR WATICHES WITH FOOTINGS SHALL BE FULL HEIGHT.
4. ALL EXTERIOR WALLS SHALL BE 2X8 @ 16" O.C. FOR OTHER STUD SIZE AND SPACING SEE ARCH.
5. FOR NON-BEARING WALL CONN. @ TOP, SEE S4.3TYP.
6. FOR OPENING IN SHEARWALL PANELS, SEE S4.4.
7. SPECIAL INSPECTION IS REQ'D, SEE SHEET S1.19.
8. FOR PIPES THRU SILL PLATES, SEE S4.5.

LEGEND:
E " INDICATES WALL BELOW

1. FOR DIMENSIONS NOT SHOWN, SEE ARCH.
2. FINISH FLOOR REFERENCE DATUM ELEVATION = 1'-0" U.O.
3. INTERIOR WATICHES WITH FOOTINGS SHALL BE FULL HEIGHT.
4. ALL EXTERIOR WALLS SHALL BE 2X8 @ 16" O.C. FOR OTHER STUD SIZE AND SPACING SEE ARCH.
5. FOR NON-BEARING WALL CONN. @ TOP, SEE S4.3TYP.
6. FOR OPENING IN SHEARWALL PANELS, SEE S4.4.
7. SPECIAL INSPECTION IS REQ'D, SEE SHEET S1.19.
8. FOR PIPES THRU SILL PLATES, SEE S4.5.
SLOPE

TYP. NON-VEHICULAR SLAB:
6" CONC. SLAB-ON-GRADE
REINF. w/ #5 @ 18" O.C. EA. WAY,
CENTERED IN SLAB
OVER 12" OF 2 (A OR B) COMPACTED TO 95% RELATIVE COMPACTION

6" CONC. CURB,
TYP.

HSS4X4X3/16

30" x 30" x 24" D FTG.

HSS4X4X3/16

HSS4X4X3/16

183x202
8' HIGH, 12" CONC WALL REINF. w/
#5@12" O.C. EA. FACE (V)
#4@18" O.C. EA. FACE (H)

GENERATOR, SEE MECH FOR LOCATION

HSS4X4X3/16

2X12 @ 24" O.C.

6X12

6X12

6X12

6X12

6X12

TYP. ROOF PLYWOOD:
1/2" CD-X PLYWOOD
PII 32/16 w/
BOUNDARY NAIL 8d @ 6" O.C.
EDGE NAIL 8d @ 6" O.C.
FIELD NAIL 8d @ 12" O.C.
BLOCK ALL UNSUPPORTED EDGES
FACE GRAIN PERPENDICULAR TO FRAMING
ALL NAILS SHALL BE COMMON WIRE
NOTE: FOR TOP OF WALL ELEVATIONS AND FINISHED GRADED ELEVATIONS IN FRONT OF WALL SEE V.01 DRAWING C.01

ALIGN FOOTING ACCORDING TO PROPERTY BOUNDARY

TYPE "A"

SEE RETAINING WALL DETAIL ON S5.1

SEE RETAINING WALL DETAIL ON 55'-0"
NORTH CMU WALL ELEVATION (LOOKING FROM INSIDE)

SOUTH CMU WALL ELEVATION (LOOKING FROM INSIDE)
CINCINNATI EXHAUST FAN SUPPORT

SECTION AT GENERATOR

FIRE STATION #41
COASTSIDE FIRE PROTECTION DISTRICT
OBISPO ROAD
EL GRANADA, CA 94018

JLO
DRO
JLO
OF
157

50% CD'S
05/02/17

Orie Engineering
2 STRUCTURAL AND BRIDGE ENGINEERS
9750 Miramar Road, Suite 310
San Diego, CA 92126
www.Orie2.com
www.jeffkatzarchitecture.com
JKA
ARCHITECTURE
6353 DEL CERRO BOULEVARD | SAN DIEGO, CA 92120 | 619.698.9177

BUILDING DEPARTMENT SUBMITTAL 08/24/17
BUILDING DEPARTMENT RESUBMITAL 12/15/17
BID SET 03/01/18

BID SET 05/24/18

SECTION AT GENERATOR

PLAN

Cincinnati Exhaust Fan Support
MECHANICAL LEGEND & SYMBOLS

MECHANICAL LEGEND & SYMBOLS

ENERGY CONSERVATION NOTES

1. ALL REFRIGERANT LINES TO BE INDIVIDUALLY INSULATED AS REQUIRED BY CODE.
### SPLIT DX HEAT PUMP/FAN COIL SCHEDULE

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<th>MANUFACTURER</th>
<th>MODEL NO</th>
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<th>UNIT SIZE</th>
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<th>BTU H</th>
<th>CAP</th>
<th>COMF.</th>
<th>ENT.</th>
<th>TEMPERATURE</th>
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### SPLIT DX AIR CONDITIONING SYSTEM SCHEDULE

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### EXHAUST FAN SCHEDULE

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<th>CAP</th>
<th>COMF.</th>
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<td>20</td>
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### Gravity Ventilator Schedule

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<th>EQUIPMENT DESCRIPTION</th>
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<th>OPER. THROAT SIZE (IN)</th>
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### Mandatorily Title 24 Notes for Controls Contractor

1. Section 110.2(c) of Title 24 requires that ventilation systems shall not operate at all times and be designed to reduce infiltration when not in use.
2. Section 110.2(d) of Title 24 requires that ventilation systems shall not operate at all times and be designed to reduce infiltration when not in use.
3. Section 110.2(e) of Title 24 requires that ventilation systems shall not operate at all times and be designed to reduce infiltration when not in use.
4. Section 110.2(f) of Title 24 requires that ventilation systems shall not operate at all times and be designed to reduce infiltration when not in use.
5. Section 110.2(g) of Title 24 requires that ventilation systems shall not operate at all times and be designed to reduce infiltration when not in use.

### Notes About Installation, Sealing, and Insulation of Air Distribution Ductwork Systems

1. Air distribution duct systems shall be insulated and sealed as required by Section 120.4 of the 2016 Building Energy Efficiency Standards.
2. All ventilation systems shall be designed, insulat and sealed as required by Section 120.4 of the 2016 Building Energy Efficiency Standards.

### Notes For Commissionsing Agent

1. The commissioning agent shall perform a plan in accordance with Section 120.2 of the 2016 Building Energy Efficiency Standards.
2. The commissioning agent shall perform functional performance testing in accordance with Section 120.2 of the 2016 Building Energy Efficiency Standards.
GENERAL NOTES

1. REFER TO DRAWINGS M1.0 AND M1.1 FOR MECHANICAL WORK RELATED TO THIS AREA.

MECHANICAL SITE PLAN

SCALE: 1" = 20'-0"
1. REFER TO DRAWING M4.2 FOR SCHEMATIC PIPING OF THE VRF SYSTEM AND PIPE SIZES.
2. REFER TO DETAIL 1/M3.3 FOR MOUNTING OF BRANCH SELECTOR BOX.
3. REFER TO DETAIL 5/M3.2 FOR MOUNTING OF DX PIPING & ASSOCIATED WITH OUTDOOR UNITS.
4. CONFIRM PIPE ROUTING ON THE FIELD BEFORE INSTALLATION.
5. CONFIRM SIZES OF THE DX PIPING ASSOCIATED WITH THE SPLIT SYSTEMS WITH MANUFACTURER.
OUTSIDE AIR INTAKE.

DISCHARGE.

COMMON DISCHARGE.

CONCENTRIC FLUE VENT FROM UNIT HEATER.

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1. PROVIDE FLEXIBLE DUCT CONNECTIONS.
   MINIMUM 24" IN LENGTH.

2. ALL FAN COILS SHALL BE FURNISHED WITH CONDENSATE OVERFLOW SWITCHES.

3. PROVIDE SEISMIC CABLE BRACING (2 PER UNIT-OPPOSITE DIAGONAL LOCATION).

4. MAINTAIN MINIMUM MANUFACTURER RECOMMENDED SERVICE CLEARANCE.

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34. MAINTAIN MINIMUM MANUFACTURER RECOMMENDED SERVICE CLEARANCE.
1. SMOKE/FIRE DAMPER DETAIL FOR REFERENCE ONLY. INSTALL 1/2 HOUR RATED DUROMICRO® FRAMING SHEET (60 MIN. RATED SHEET IS AVAILABLE). INSTALL 1/2 HOUR RATED SURFACE MOUNTED SMOKE/FIRE DAMPER IN PENETRATIONS OF LESS THAN 3" DUCT. INSTALL 1/2 HOUR RATED DUCT MOUNTED SMOKE/FIRE DAMPER IN PENETRATIONS OF 3" DUCT OR MORE. INSTALL 1/2 HOUR RATED DUCT MOUNTED SMOKE/FIRE DAMPER IN PENETRATIONS OF 3" DUCT OR MORE. INSTALL 1/2 HOUR RATED DUCT MOUNTED SMOKE/FIRE DAMPER IN PENETRATIONS OF 3" DUCT OR MORE.

2. MOUNTING ANGLES SHALL BE 1 1/2"x1 1/2"x16 GAUGE MIN. FASTENED WITH NO. 10 SCREWS 8" ON CENTER.

3. USE ONLY STATE OF CALIFORNIA FIRE MARSHALL LISTED SMOKE/FIRE DAMPERS & METALS IN ACCORDANCE WITH CODE FIRE MARSHALL.

4. GENERAL CONTRACTOR SHALL COORDINATE CEILING ACCESS DOORS AS REQUIRED.

5. ACCESS DOOR SHALL HAVE A LABEL WITH THE LETTERS NOT LESS THAN 1/2" READING "FIRE DAMPER".

6. MANUFACTURER'S PRINTED INSTRUCTIONS SHALL BE MADE AVAILABLE TO INSPECTION AUTHORITIES.

7. EACH ACCESS DOOR SHALL BE PROVIDED IN DUCT AND SHALL BE OF ADEQUATE SIZE FOR INSPECTION AND MUST BE LARGE ENOUGH TO PERMIT MAINTENANCE AND RESETTING OF THE DAMPER.

8. MANUFACTURERS PRINTED INSTRUCTIONS SHALL BE MADE AVAILABLE TO INSPECTION AUTHORITIES.

9. WHEN A SMOKE SIGNAL IS DETECTED, THE DAMPER WILL CLOSE AND REMAIN CLOSED UNTIL THE SMOKE CONDITIONS SIGNAL CEASES. THE SYSTEM WILL THEN REQUIRE MANUAL RESET.

10. WHEN A FIRE DAMPER IS INSTALLED IN AN AIR DUCT, A TIGHT FITTING HINGED OR SLIDING ACCESS DOOR MUST BE PROVIDED ON THE DUCT. AND THE DOOR SHALL COMPLY WITH THE FOLLOWING:

   a. THE DOOR SHALL BE CONSTRUCTED OF MATERIAL WHICH IS EQUAL TO OR GREATER IN THICKNESS TO 1-HOUR FIRE RESISTANCE WALLS. INSTALL 3" M3.3 GAUGE PER U.M.C.

   b. PROVIDE CEILING ACCESS PANEL(S) AS REQUIRED BY MANUFACTURER.

   c. PROVIDE MINIMUM SERVICE CLEARANCES AS FOLLOWS:

      - CODE MIN. DISTANCE TO STRUCTURE
      - STANDARD 'S' SLIP JOINT, DAMPER FRAME
      - DAMPER MOUNTING ANGLES
      - DAMPER ACTUATOR
      - JUNCTION BOX/RELAY
      - CONDUIT/CONDUIT BOX
      - MALFUNCTION AND MOTOR INSTALLATION
      - TRANSFER AIR DETAIL

   d. INSTALL IN ACCORDANCE WITH STATE FIRE MARSHALL.

   e. GENERAL CONTRACTOR SHALL COORDINATE CEILING ACCESS DOORS AS REQUIRED.

   f. PROVIDE CEILING ACCESS PANEL(S) AS REQUIRED BY MANUFACTURER.

   g. PROVIDE CEILING ACCESS PANEL(S) AS REQUIRED BY MANUFACTURER.

   h. PROVIDE CEILING ACCESS PANEL(S) AS REQUIRED BY MANUFACTURER.

   i. PROVIDE CEILING ACCESS PANEL(S) AS REQUIRED BY MANUFACTURER.

   j. PROVIDE CEILING ACCESS PANEL(S) AS REQUIRED BY MANUFACTURER.

   k. PROVIDE CEILING ACCESS PANEL(S) AS REQUIRED BY MANUFACTURER.

   l. PROVIDE CEILING ACCESS PANEL(S) AS REQUIRED BY MANUFACTURER.

   m. PROVIDE CEILING ACCESS PANEL(S) AS REQUIRED BY MANUFACTURER.

   n. PROVIDE CEILING ACCESS PANEL(S) AS REQUIRED BY MANUFACTURER.

   o. PROVIDE CEILING ACCESS PANEL(S) AS REQUIRED BY MANUFACTURER.

   p. PROVIDE CEILING ACCESS PANEL(S) AS REQUIRED BY MANUFACTURER.

   q. PROVIDE CEILING ACCESS PANEL(S) AS REQUIRED BY MANUFACTURER.

   r. PROVIDE CEILING ACCESS PANEL(S) AS REQUIRED BY MANUFACTURER.

   s. PROVIDE CEILING ACCESS PANEL(S) AS REQUIRED BY MANUFACTURER.

   t. PROVIDE CEILING ACCESS PANEL(S) AS REQUIRED BY MANUFACTURER.

   u. PROVIDE CEILING ACCESS PANEL(S) AS REQUIRED BY MANUFACTURER.
Additional refrigerant charge is needed depending on the size and length of extended piping.
VARIABLE REFRIGERANT FLOW WITH HEAT RECOVERY SEQUENCE OF OPERATIONS

A. Startup Sequence: When the power is turned on, the initial processing of the(heat(recovery) system starts. The system's main function is to control the temperature and humidity of the environment. The outdoor unit starts up after the compressor is started, and the indoor unit starts up after the fan is started. The startup sequence is performed before the second fan goes into operation, the capacity of the first fan is reduced to 50%. During the first 3 minutes of the operation is 50 Hz. When the power is turned on, the initial operation sequence starts. startup sequence rotation is performed while all the indoor units are stopped. When the outdoor unit fan is stopped while the compressor is not operating. The outdoor unit fan stops while the compressor is stopped. The fan operates at full speed for 5 seconds after start-up (only when TH7 < 32°F. The outdoor unit fan speed for 5 seconds after start-up (only when TH7 < 32°F.

B. Defrost Operation Control: The defrost cycle will not start if other outdoor units are in the defrost cycle or until a minimum of 10 minutes have passed since the completion of the last defrost cycle. A defrost cycle can be started by setting DIP SW4 (913) to ON. Even if the defrost cycle took 12 minutes. All units in the heating mode will simultaneously go into the defrost cycle. The defrost cycle will start when all of the three conditions are met. Conditions shown in the table below.

C. Compressor Frequency Control: The defrost cycle will not start if other outdoor units are in the defrost cycle or until a minimum of 10 minutes have passed since the completion of the last defrost cycle. A defrost cycle can be started by setting DIP SW4 (913) to ON. Even if the defrost cycle took 12 minutes. All units in the heating mode will simultaneously go into the defrost cycle. The defrost cycle will start when all of the three conditions are met. Conditions shown in the table below.

D. Capacity Control of Outdoor Fan and Heat Exchanger: The defrost cycle will not start if other outdoor units are in the defrost cycle or until a minimum of 10 minutes have passed since the completion of the last defrost cycle. A defrost cycle can be started by setting DIP SW4 (913) to ON. Even if the defrost cycle took 12 minutes. All units in the heating mode will simultaneously go into the defrost cycle. The defrost cycle will start when all of the three conditions are met. Conditions shown in the table below.

E. Outdoor Unit Fan Operation:"
PROJECT NO.: 4119
MECHANICAL T24 DOCUMENTATION

FIRE STATION #41
OBISPO ROAD ENCINITAS
GRANADA, CA 94018

BID SET 05/24/18

Description: Date:

BID SET 05/24/18
### Project: COASTSIDE FIRE DISTRICT
### Building: FIRE STATION #41
### Address: OBISPO ROAD EL GRANADA, CA 94018

#### Description:

- **Project Number:** 4119
- **Mechanical M5.2**
- **Fire Station #41**
- **Coastside Fire District**

#### Date:

- **BID SET 08/24/17**
- **05/02/17**
- **12/15/17**
- **03/01/18**

#### Checker:

- [Name]

#### Approver:

- [Name]

#### Author:

- [Name]
1. GENERAL NOTES

PLYMOVENT VEHICLE EXHAUST CONTROL SYSTEM PANEL. COORDINATE LOCATION WITH MANUFACTURER AND/OR ARCHITECT BEFORE INSTALLATION.

KEY NOTES

MECHANICAL ZONING PLAN

REFER TO DETAIL 3/M3.2 FOR MOUNTING OF SPACE TEMPERATURE SENSORS (OR THERMOSTATS). COORDINATE FINAL LOCATION WITH ARCHITECT BEFORE INSTALLATION.
SEWER VENTING CALC.

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<th>PIPE SIZE (IN.)</th>
<th>QTY.</th>
<th>PIPE CROSS SECTION AREA (SQ.IN.)</th>
<th>TOTAL AREA (SQ.IN.)</th>
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<tbody>
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<tr>
<td>3</td>
<td>1</td>
<td>12.56</td>
<td>12.56</td>
</tr>
</tbody>
</table>

TOTAL AREA = 32.98

*VENTING AREA EXCEEDS SEWER DRAIN BEING SERVED.*
**CONDENSATE DRAIN TO LAVATORY**

- Condensate drain fitting
- Stud wall
- Lavatory
- 3/4" condensate line
- Trap with condensate drain fitting
- 1/2" soft copper tube
- 9" trap

**TRAP PRIMER CONNECTION DETAIL**

- Finished floor
- Condensate drain fitting
- Floor drain with trap primer stub
- Trap primer connection
- 1/2" soft copper tube
- Universal channel

**PIPE SUPPORT DETAIL**

- Universal channel
- Pipe & insulation with full circle sleeve and pipe protection saddles
- Channel transverse braces (typical)
- Adjusting steel yoke pipe rail
- Bolt sleeve clevis hanger adjustable steel yoke pipe rail
- Roller type pipe hanger
- Adjustable hinge (typical)
- Standard type pipe hanger

**CONDENSATE DRAIN TO FLOOR SINK**

- Finished floor
- Condensate drain fitting
- 1" min. above flood rim

**PIPE HANGER DETAIL**

- Trap primer connection detail
- Floor drain with trap primer stub
- Bolt sleeve clevis hanger adjustable steel yoke pipe rail

**NOTE:**

1. Refer to CBC 2016, Table 3-2 for standard and seismic hanger spacing alternations and requirements.
### Feeder Schedule

<table>
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<tr>
<th>Conduit Type</th>
<th>Feeder Type</th>
<th>Number of Conductors</th>
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<tr>
<td>PVC</td>
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<tr>
<td>PVC</td>
<td>Branch</td>
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### Arc-Flash Schedule

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<th>Device</th>
<th>Required Voltage</th>
<th>Incident Energy</th>
<th>Working Distance</th>
<th>Minimum Arc Flash Protection (AIC)</th>
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<tbody>
<tr>
<td>M1</td>
<td>220V</td>
<td>530</td>
<td>0.5</td>
<td>18 J/cm²</td>
</tr>
<tr>
<td>P1</td>
<td>220V</td>
<td>530</td>
<td>1.5</td>
<td>18 J/cm²</td>
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<tr>
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<td>2.0</td>
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### Voltage Drop Schedule

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<th>Voltage</th>
<th>Wire Size</th>
<th>Voltage Circuit Number</th>
<th>Wire Size</th>
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<tr>
<td>M1</td>
<td>220V</td>
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<td>208V</td>
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<tr>
<td>P1</td>
<td>220V</td>
<td>3/0</td>
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### Fault Current Schedule

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<th>Voltage</th>
<th>Size</th>
<th>Length</th>
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<th>2% Fault Amp</th>
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<tr>
<td>M1</td>
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<td>350kcmil</td>
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**Motor 36139**  VA  112.95%  40819 VA

**Legend:**

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<tr>
<th>CKT</th>
<th>Circuit Description</th>
<th>Trip</th>
<th>Poles</th>
<th>A</th>
<th>B</th>
<th>C</th>
<th>Poles</th>
<th>Trip</th>
<th>Circuit Description</th>
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<td>--</td>
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<td>BF-2-10</td>
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<td>--</td>
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**Supply From:**

**Enclosure:**

**Mounting:**

**Location:**

**Space 290**

**MSB**

**Total Load:**

108 A  92 A  104 A

**Phases:**

120/208 Wye

**Wires:**

**Volts:**

100.00%

**Mains Rating:**

**A.I.C. Rating:**

**Total Est. Demand:**

22,000 A

**2. PROVIDE DEDICATED NEUTRAL AND EQUIPMENT GROUND.**

**3. PROVIDE INTEGRAL (INTERNAL) TVSS UNIT.**

**4. PROVIDE ARC FAULT CIRCUIT INTERRUPTER TYPE CIRCUIT BREAKER.**

**5. PROVIDE EXCLUDED NEUTRAL AND GROUNDING DEVICE.**

**PROVIDE NITE LIGHTING BRANCH CIRCUIT “LCP1” CONTROLLED, SEE DETAIL E9.1.
<table>
<thead>
<tr>
<th>CKT</th>
<th>Circuit Description</th>
<th>Trip</th>
<th>Poles</th>
<th>Phase</th>
<th>Load</th>
<th>Total Amps</th>
<th>Volts</th>
<th>NEUTRAL RATING</th>
<th>Total Load</th>
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<td>1</td>
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<td></td>
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<td>1</td>
<td>200 VA</td>
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<td>1250 VA</td>
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<td>125 A</td>
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</table>

**Notes:**
- Provide integral (internal) TVSS unit.
- Refer to single line diagram, sheet E2.1, for panel available.
- Provide "red" circuit breaker "lock on" device.
- Provide circuit breaker "lock on" device.
- Provide Nite lighting branch circuit "LC X" controlled, see detail.
- Provide ground fault circuit interrupter type circuit breaker.
<table>
<thead>
<tr>
<th>Calcut</th>
<th>Volts</th>
<th>Poles</th>
<th>KVA</th>
<th>Panel</th>
<th>Switch</th>
<th>Frame</th>
<th>Disconnect Type</th>
<th>Fuse Type</th>
<th>NEMA Rating</th>
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<tbody>
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<td>120</td>
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<td>0.30</td>
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<td>20 A</td>
<td>21</td>
</tr>
<tr>
<td>BAUER COMPRESSOR</td>
<td>208</td>
<td>3</td>
<td>11.10</td>
<td>M1</td>
<td>4,6,8</td>
<td>40 A</td>
<td>RK5</td>
<td>FUSED DISCONNECT</td>
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<tr>
<td>BC-1</td>
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<td>2</td>
<td>0.34</td>
<td>M2</td>
<td>24,26</td>
<td>20</td>
<td>30 A</td>
<td>FUSED DISCONNECT</td>
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**Notes:**
- **E17320**
- **50% CD'S 05/02/17**
- **BUILDING DEPARTMENT SUBMITTAL**
- **BUILDING DEPARTMENT RESUBMITAL**
- **BID SET 05/24/18**
- **05/24/17**
- **08/24/17**
- **12/15/17**
- **03/01/18**

**Coastside Fire District**

**Obispo Road**

**El Granada, CA 94018**

**JEFF KATZ ARCHITECTURE**

**6353 Del Cerro Boulevard | San Diego, CA 92120 | 619.698.9177**

---

**Building Equipment Schedule**

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<th>No.</th>
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CONSTRUCTION NOTES

1. PROVIDE ON-SITE LOCATION OF EXISTING PG&E POWER POLES TO BE DEMOLISHED WITH (1) 3/0" TWIN-II PRIMARY SERVICE CABLE AND APPROPRIATE CONDUIT TO TELEPHONE BACKBOARD STUB-UP LOCATIONS. PROVIDE AND INSTALL (2) 2" RISER TO TELEPHONE BACKBOARD STUB-UP LOCATIONS IN ACCORDANCE WITH AT&T UTILITY TRENCH REQUIREMENTS. SEE FLOOR PLAN 4/E8.1 FOR MORE INFORMATION.

2. PROVIDE UNDERGROUND (2) 2" CATV SERVICE WITH PULL ROPE PER CATV SHOP DRAWINGS.

3. PROVIDE AND INSTALL (2) 2" RISER TO TELEPHONE BACKBOARD STUB-UP LOCATIONS. PROVIDE AND INSTALL IN ACCORDANCE WITH AT&T UTILITY TRENCH REQUIREMENTS. SEE FLOOR PLAN 4/E8.1 FOR MORE INFORMATION.

4. PROVIDE UNDERGROUND (2) 2" AT&T SERVICE WITH PULL ROPE PER AT&T SHOP DRAWINGS.

5. PROVIDE AND INSTALL (2) 2" RISER TO TELEPHONE BACKBOARD STUB-UP LOCATIONS. PROVIDE AND INSTALL IN ACCORDANCE WITH AT&T UTILITY TRENCH REQUIREMENTS. SEE FLOOR PLAN 4/E8.1 FOR MORE INFORMATION.

6. PROVIDE UNDERGROUND (2) 2" RISER FOR CATV SERVICE WITH PULL ROPE PER CATV SHOP DRAWINGS.

7. PROVIDE UNDERGROUND (2) 2" AT&T SERVICE WITH PULL ROPE PER AT&T SHOP DRAWINGS.

8. PROVIDE UNDERGROUND (1) 5" PG&E PRIMARY SERVICE WITH PULL ROPE PER PG&E SHOP DRAWINGS.

9. PROVIDE UNDERGROUND (1) 5" CATV PRIMARY SERVICE WITH PULL ROPE PER CATV SHOP DRAWINGS.

10. PROVIDE UNDERGROUND (1) 5" AT&T PRIMARY SERVICE WITH PULL ROPE PER AT&T SHOP DRAWINGS.
E4.1

LIGHTING

3 PROVIDE THREE SPEED DIGITAL FAN CONTROL. COORDINATE WITH LUMINAIRE TO BE CONTROLLED THROUGH PHOTOCELL AND TIME CLOCK.

4 ENGRAVE SWITCH PLATE TO READ "MAP LIGHT".

5 ENGRAVE SWITCH PLATE TO READ "EXTERIOR WORKLIGHTS".

6 PROVIDE MOTION SENSORS. LIGHTING POWER SHALL INCREASE TO 100%.

7 PROVIDE THEM TO THE COMMISSIONING AGENT FOR REVIEW.

8 REQUIREMENTS ON ALL LIGHTING FIXTURES. IT IS THE LIGHTING DESIGNER'S RESPONSIBILITY TO COORDINATE WITH THE MANUFACTURER FOR COMPLIANCE.

9 PROVIDE THREE SPEED DIGITAL FAN CONTROL. COORDINATE WITH LUMINAIRE TO BE CONTROLLED THROUGH PHOTOCELL AND TIME CLOCK.

10 PROVIDE MOTION SENSORS. LIGHTING POWER SHALL INCREASE TO 100%.

11 PROVIDE THEM TO THE COMMISSIONING AGENT FOR REVIEW.

12 REQUIREMENTS ON ALL LIGHTING FIXTURES. IT IS THE LIGHTING DESIGNER'S RESPONSIBILITY TO COORDINATE WITH THE MANUFACTURER FOR COMPLIANCE.

13 PROVIDE THREE SPEED DIGITAL FAN CONTROL. COORDINATE WITH LUMINAIRE TO BE CONTROLLED THROUGH PHOTOCELL AND TIME CLOCK.

14 PROVIDE MOTION SENSORS. LIGHTING POWER SHALL INCREASE TO 100%.

15 PROVIDE THEM TO THE COMMISSIONING AGENT FOR REVIEW.

16 REQUIREMENTS ON ALL LIGHTING FIXTURES. IT IS THE LIGHTING DESIGNER'S RESPONSIBILITY TO COORDINATE WITH THE MANUFACTURER FOR COMPLIANCE.

17 PROVIDE THREE SPEED DIGITAL FAN CONTROL. COORDINATE WITH LUMINAIRE TO BE CONTROLLED THROUGH PHOTOCELL AND TIME CLOCK.

18 PROVIDE MOTION SENSORS. LIGHTING POWER SHALL INCREASE TO 100%.

19 PROVIDE THEM TO THE COMMISSIONING AGENT FOR REVIEW.

20 REQUIREMENTS ON ALL LIGHTING FIXTURES. IT IS THE LIGHTING DESIGNER'S RESPONSIBILITY TO COORDINATE WITH THE MANUFACTURER FOR COMPLIANCE.
CONSTRUCTION NOTES

1. PROVIDE SHOP AIR COMPRESSOR "EPO" EMERGENCY POWER OFF
   FOR REQUIREMENTS.
2. PROVIDE UNIT HEATERS 1, 2, 3 & 4 3/4"C, 1#10, #10N, #10G
3. PROVIDE ACTION TO AVOID HEAT HUBS FOR EXHAUSTION AND STOR.
4. PROVIDE SHOP AIR COMPRESSOR "EPO" EMERGENCY POWER OFF
   FOR REQUIREMENTS.
5. PROVIDE UNIT HEATERS 1, 2, 3 & 4 3/4"C, 1#10, #10N, #10G
6. PROVIDE ACTION TO AVOID HEAT HUBS FOR EXHAUSTION AND STOR.

EXP. 06/30/18

MECHANICAL POWER

MECHANICAL POWER
FIGURE 11B-308.2.1
UNOBSTRUCTED FORWARD REACH

FIGURE 11B-308.2.2
OBSTRUCTED HIGH FORWARD REACH

FIGURE 11B-308.3.1
UNOBSTRUCTED SIDE REACH

FIGURE 11B-308.3.2
OBSTRUCTED HIGH SIDE REACH
GEOTECHNICAL INVESTIGATION

Coastside Fire Protection District
Coastside Fire Station No. 41
Half Moon Bay, California

PREPARED FOR:
JEFF KATZ ARCHITECTURE
6353 DEL CERRO BOULEVARD
SAN DIEGO, CALIFORNIA

PREPARED BY:
GEOCON CONSULTANTS, INC.
6671 BRISA STREET
LIVERMORE, CALIFORNIA  94550

GEOCON PROJECT NO. E8940-04-01
AUGUST 2016
Dear Ms. Constandse:

In accordance with your authorization of our proposal dated July 8, 2015, we have performed a geotechnical investigation for the subject Coastside Fire Protection District project in Half Moon Bay, California. Our investigation was performed to observe the soil and geologic conditions that may impact site development and construction 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.

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.

Shane Rodacker, GE
Senior Engineer

(1/e-mail)  Addressee
(1/e-mail)  Jeff Katz Architecture
Attn:  Mr. Jeff Katz
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LIMITATIONS AND UNIFORMITY OF CONDITIONS

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LIST OF REFERENCES
GEOTECHNICAL INVESTIGATION

1. PURPOSE AND SCOPE

This report presents the results of a geotechnical investigation for the proposed new Coastside Fire Station No. 41 in Half Moon Bay, 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 July 13, 2016 and included 5 soil borings to maximum depths of approximately 40 feet or less at the site. The locations of our exploratory 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. 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 is proposed on the northwestern side of Coronado Street between Obispo Road and Avenue Alhambra in Half Moon Bay. The project site is the southeastern portion of a 2 ¾ acre parcel that extends northward to Avenue Portola. Topographically, the irregularly-shaped site slopes moderately to the southwest with ground surface elevations on the order of 45 to 50 feet MSL along Avenue Alhambra and 25 to 35 feet MSL along Obispo Road, according to topographic information in the grading plans by BKF Engineers. The site is generally undeveloped with native grasses and a few mature trees. Overhead utility lines are present along the bordering streets.

The information provided by Jeff Katz Architecture indicates the new fire station will be situated approximately 350 feet north of Coronado Street with associated driveways and parking areas to the northwest and southeast of the new fire station building. We understand the new fire station will be single story with no subterranean levels. However, the northeast wall of the fire station will be a cast-in-place retaining wall contiguous with the site retaining wall discussed below. The new fire station will be configured with a central apparatus bay that opens to driveways on either side of the station. Storage areas and living quarters are proposed on the northeast and southwest sides of the apparatus bay, respectively. A maximum building height of 30 feet is proposed at the roof line over the apparatus bay. The fire station will utilize concrete slab-on grade and conventional shallow footings for foundation support.
The grading plans indicate significant cuts and comparatively minor fills will be required to create a building pad and establish rough subgrade for pavement and parking areas. Cuts up to approximately 16 feet and fills of 5 feet or less are anticipated within the building footprint. Grade breaks resulting from cuts on the northeastern side of the site (along Avenue Alhambra) will be accomplished with site retaining walls with maximum retained heights on the order of 17 feet - including the northeastern wall of the fire station.

3. GEOLOGIC SETTING

Half Moon Bay 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 and also distributed, to a lesser extent, across a number of 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 as a result 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.

Geologic mapping by the United States Geological Survey (USGS) indicates the site is underlain by Pleistocene-age marine terrace deposits.

4. GEOLOGIC HAZARDS

4.1 Faulting and Seismicity

The site is not located within an Alquist-Priolo Earthquake Fault Zone as established by the State of California around known active faults. A review of the referenced geologic materials and our knowledge of the general area indicate that the site is not underlain by active faults.
The table below presents approximate distances to active faults in the site vicinity based on web-based mapping by the USGS and California Geological Survey (CGS). Site latitude is 37.5009° N; site longitude is 122.4681° W.

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</tr>
<tr>
<td>Silver Creek</td>
<td>24 ½</td>
<td>6.9</td>
</tr>
</tbody>
</table>

The faults tabulated above are sources of potential ground motion. However, earthquakes that might occur on other faults within northern and central California are also potential generators of significant ground motion and could subject the site to intense ground shaking.

### 4.2 Surface Fault Rupture

The site is not within a currently established State of California Earthquake Fault 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. The California Geological Survey defines an active fault as a fault that shows evidence for activity within the last 11,000 years. A potentially active fault is generally defined as a fault that has shown evidence of displacement between 11,000 and 1.6 million years ago. Faults that have not demonstrated evidence of movement with the past 1.6 million years are generally considered inactive.

### 4.3 Ground Shaking

We used the beta version of the USGS web-based application *Unified Hazard Tool* to estimate 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 1.34g and the modal magnitude is 7.9 for Seismic Site Class D (V_s30 of 259 m/sec) based on 2014 models within the application.

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.
4.4  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.

Web-based mapping by the USGS indicates the subject site possesses a “moderate” susceptibility to liquefaction. Our liquefaction analysis identified a potentially liquefiable sand layer at Boring B3. The layer is located below a depth of approximately 23 feet and appears to be less than approximately 2 feet in thickness. Consequences of liquefaction can include ground surface settlement, ground loss (sand boils) and lateral slope displacements (lateral spreading). For liquefaction-induced sand boils or fissures to occur, pore water pressure induced within liquefied strata must exert enough force to break through overlying, non-liquefiable layers. Based on methodology recommended by Youd and Garris (1995), which modified and advanced original research by Ishihara (1985), a capping layer of non-liquefiable soil can prevent the occurrence of sand boils and fissures. In our opinion, based on the presence of the clay layer that mantles the abutment areas and the depth to significant liquefiable layers, the potential for ground loss due to sand boils or fissures at the existing abutment areas is considered low.

A likely consequence of potential liquefaction at the site is ground surface settlement. We evaluated the potential for liquefaction and resultant settlements at the site using the soil boring data and the methodology of Youd et al. (2001). We used a ground motion of 0.88g as required by 2016 California Building Code (CBC) and related publications, an earthquake moment magnitude (Mw) of 7.9, and a groundwater depth of 13 feet. If liquefaction were to occur, we estimate that it may result in total foundation settlements on the order of ½ inch or less.

4.5  Landslides

There are no known landslides near the site nor is the site in the path of any known or potential landslides. We did not observe overt indications of landslide or slope instability during our site reconnaissance. We do not consider the potential for a landslide to be a significant hazard to this project.

4.6  Tsunamis and Seiches

Based on mapping by the California Emergency Management Agency, the site would be inundated by run-up during an extreme tsunami. The potential for inundation should be considered in project planning and design.

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 **Terrace Deposits**

Our soil borings encountered marine terrace deposits observed to be medium stiff to hard silts and clays with variable amounts of sand and medium dense to very dense fine to coarse sands with variable amounts of clay. Based on our laboratory testing, some of the clays encountered in our borings are highly plastic and may possess significant expansion potential. Our borings encountered terrace deposits to the maximum depth explored – approximately 40 feet below existing grade.

5.2 **Groundwater**

Groundwater was encountered in Borings B2 and B3 at depths of approximately 23 feet and 13 feet, respectively. Groundwater levels will vary seasonally and fluctuate with variations in rainfall, temperature and other factors and may be higher or lower than observed during our study.
6. CONCLUSIONS AND RECOMMENDATIONS

6.1 General

6.1.1 It is our opinion that neither soil nor geologic conditions were encountered during our investigation that would preclude the project as presently proposed.

6.1.2 A key geotechnical consideration for the project is the expansive nature of clayey soils within the native terrace deposits. The recommendations provided below are intended to mitigate the potential effects of soil expansion.

6.1.3 All references to relative compaction and optimum moisture content in this report are based on ASTM D 1557 (latest edition).

6.1.4 Based on site topography, we anticipate that site grading may create a cut-fill transition within the building pad. Recommendations to mitigate the potential effects of the cut-fill transition (primarily the potential for adverse differential settlements) are provided herein.

6.1.5 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 less than ½ inch across a horizontal distance of 50 feet. Final design foundation loadings should be reviewed by Geocon. In addition to the settlement estimates above, site improvements should be designed to accommodate up to ½ inch of seismically-induced differential settlement across a horizontal distance of 50 feet.

6.1.6 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.

6.2 Seismic Design Criteria

6.2.1 We understand that seismic structural design will be performed in accordance with the provisions of the 2016 CBC which is based on the American Society of Civil Engineers (ASCE) publication Minimum Design Loads for Buildings and Other Structures (ASCE 7-10). We used the USGS web-based application US Seismic Design Maps to evaluate site-specific seismic design parameters in accordance with the 2016 CBC and ASCE 7-10. Results are summarized in Table 6.2.1. The values presented are for the risk-targeted maximum considered earthquake (MCE\textsubscript{R}).
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 7-10 for the mapped maximum considered geometric mean (MCE\(_\text{G}\)).

6.3 Soil and Excavation Characteristics

6.3.1 Based on the soils conditions encountered in our exploratory borings, the majority of onsite soils can be excavated with moderate to heavy effort using conventional excavation equipment. We
do not anticipate excavations in the native terrace deposits will generate oversize material (greater than 6 inches in nominal dimension).

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 Some of the site soils should be considered expansive as defined by 2016 CBC. The recommendations presented in this report assume that foundations for the project will derive support in properly compacted fills or competent native soils.

6.4 **Materials for Fill**

6.4.1 Excavated soils generated from cut operations 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 or low-expansive material should be well-graded, 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 earthwork should be observed and all fills tested for recommended compaction and moisture content by representatives of Geocon.

6.5.2 Structural building pad areas should be considered as areas extending a minimum of 5 feet horizontally beyond the outside dimensions of buildings, including footings and overhangs carrying structural loads.

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 Site preparation should commence with stripping existing vegetation and any organic-laden topsoil. The root balls for all trees and shrubs should be grubbed to remove all roots greater than approximately 1 inch in diameter. Organics generated by clearing and grubbing should not be used within fills in structural areas.

6.5.5 Although not expected, any 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 site clearing operations, or other existing excavations or depressions, should be restored with engineered fill in accordance with the recommendations of this report.

6.5.6 The cut and shallow fill portions of the building pad for the fire station should be over-excavated to a depth of approximately 1 foot below the bottom of footings. The resultant bottom surface should be scarified to a depth of approximately 8 inches and compacted to at least 90% relative compaction at least 2% above moisture content. In general, remedial grading should result in at least four feet of properly compacted fill materials (including scarified and recompacted bottoms) across the building pad. Due to the expansive nature of site soils, the upper 18 inches of subgrade for the fire station pad should be comprised of low-expansive fill as defined in Section 6.4.2.

6.5.7 All structural fill (including backfill) should be placed in layers no thicker than will allow for adequate bonding and compaction – typically 8 inches. Fill soils should be placed, moisture conditioned to at least 2% above optimum moisture content (near optimum where sands and gravels) and compacted to at least 90% relative compaction (at least 92% relatively compaction where sands and gravels). Fill areas with in-place density tests showing moisture contents less than optimum moisture content may require additional moisture conditioning prior to placing additional fill.

6.5.8 If grading commences in winter or spring, or in periods of precipitation, excavated and in-place soils may be, or become, wet. Earthwork contractors should be aware of moisture sensitivity of fine-grained soils and potential compaction/workability difficulties. It has been our experience the subgrade soils protected by pavement are typically moist to wet and may require significant drying prior to re-use as engineered fill. The most effective site preparation alternatives will depend on site conditions prior to and during grading operations; we should evaluate site conditions at those times and provide supplemental recommendations, if necessary.

6.6 Temporary Excavations

6.6.1 We anticipate that much of the native terrace deposits can be considered a Type B soil in accordance with OSHA guidelines. If free water, clean and/or loose sandy soils or undocumented fills are encountered the materials should be downgraded to Type C. The contractor should have a “competent person” as defined by OSHA evaluate all excavations. All onsite excavations must be conducted in such a manner that potential surcharges from existing structures, construction equipment, and vehicle loads are resisted. The surcharge area may be defined by a 1:1 projection down and away from the bottom of an existing foundation or vehicle load. Penetrations below this 1:1 projection will require special excavation measures such as sloping and possibly shoring.

6.6.2 It is the contractor’s responsibility to provide sufficient and safe excavation support as well as protecting nearby utilities, structures, and other improvements which may be damaged by earth movements.
6.7 Shallow Foundations

6.7.1 The fire station building may use conventional shallow foundations consisting of continuous strip and isolated spread footings bearing entirely in competent terrace deposits or entirely in properly compacted fill following the remedial grading discussed in Section 6.5. The following recommendations are based on the assumption that the soils within 5 feet of finish grade will possess a very low to high expansion potential (Expansion Index less than 130).

6.7.2 Strip and spread footings should have a minimum embedment depth of 24 inches below lowest adjacent pad grade. Strip footings should be at least 12 inches wide. Isolated column footings should be at least 2 feet square. Footings should be founded such that outside edge of footing bottoms are at least 10 feet horizontally from any slope face.

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 may be assumed to be equal to a fluid weighing 300 pounds per cubic foot (pcf) for footings poured neat against properly compacted fills or undisturbed natural soils. The allowable passive pressure assumes a horizontal surface extending at least 5 feet or 3 times the surface generating the passive pressure, whichever is greater. 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%. Where not protected by flatwork or pavement, the upper 1 foot of soil should be neglected when calculating passive resistance to lateral loads.

6.7.5 Minimum reinforcement for continuous footings should consist of four No. 5 steel reinforcing bars; two placed near the top of the footing and two near the bottom.

6.7.6 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.

6.7.7 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. Prior to placing rebar reinforcement, foundation excavations should be evaluated by our representatives for appropriate support characteristics and moisture content. Moisture conditioning may be required for the materials exposed in footing excavations, particularly if foundation excavations are left open for an extended period.

6.8 Underground Utilities

6.8.1 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 least 2% above optimum moisture content (at least 92% relative compaction near optimum moisture where sands and gravels).

6.8.2 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 and backfill material should conform to the requirements of the governing utility agency. Proposed bedding and pipe zone materials should be reviewed by Geocon prior to construction; materials such as ¾-inch drain rock may require wrapping with filter fabric to mitigate the potential for piping.

6.9 **Concrete Slabs-on-Grade**

6.9.1 Concrete slabs-on-grade subject to vehicle loading should be designed in accordance with the recommendations in Section 6.12 of this report.

6.9.2 Slabs-on-grade should be underlain by at least 18 inches of low-expansive fill meeting the requirements of Section 6.4.2 to reduce the potential for slab distress due shrink/swell in the expansive native soils.

6.9.3 Concrete slabs-on-grade for structures, not subject to vehicle loading, 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.

6.9.4 Interior slabs 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.

6.9.5 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. Due to the expansive soil conditions, we recommend that at least 6 inches of Class 2 Aggregate Base (AB) compacted to at least 95% relative compaction be used below exterior concrete slabs and pavements. Prior to placing AB, the subgrade should be moisture conditioned to at least 2% over optimum and properly compacted to at least 90% relative compaction.

6.9.6 Crack control joints should be spaced at intervals not greater than 8 feet for 4-inch-thick slabs (10 feet for 5-inch 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.

6.9.7 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.

6.10 Moisture Protection Considerations

6.10.1 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 convenience of the design-build team, we are providing the following recommendations. 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. If a vapor barrier is used beneath mat slab foundations, the frictional contribution to sliding resistance should be neglected.

6.10.2 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.

6.10.3 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.

6.10.4 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.

6.11 Pavement Recommendations

6.11.1 The upper 12 inches of pavement subgrade should be scarified, moisture conditioned to at least 2% over optimum and compacted to at least 92% relative compaction (near optimum and at least 95% relative compaction where predominantly sandy). 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.

6.11.2 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 6.11
FLEXIBLE PAVEMENT SECTION RECOMMENDATIONS

<table>
<thead>
<tr>
<th>Location</th>
<th>Estimated Traffic Index (TI)</th>
<th>AC (inches)</th>
<th>AB (inches)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Parking Stalls</td>
<td>4.5</td>
<td>3</td>
<td>8</td>
</tr>
<tr>
<td>Driveways</td>
<td>6.0</td>
<td>3½</td>
<td>12½</td>
</tr>
<tr>
<td>Heavy Duty</td>
<td>7.0</td>
<td>4½</td>
<td>15½</td>
</tr>
<tr>
<td>Heavy Duty</td>
<td>8.0</td>
<td>5</td>
<td>17½</td>
</tr>
</tbody>
</table>

Note: The recommended flexible pavement sections are based on the following assumptions:

1. Subgrade soil has an R-Value of 5.
2. AB: Class 2 AB with a minimum R-Value of 78 and meeting the requirements of Section 26 of the latest Caltrans Standard Specifications.
3. AB is compacted to 95% or higher relative compaction at or near optimum moisture content. Prior to placing AB, the subgrade should be proof-rolled with a loaded water truck to verify stability.
4. AC: Asphalt concrete conforming to local agency standards or Section 39 of the latest Caltrans Standard Specifications.

6.11.3 The AC sections in Table 6.11 are final, minimum thicknesses. If staged-pavements are used, the construction bottom AC lift should be at least 2 inches thick. Following construction, the finish top AC lift should be at least 1½ inches thick.

6.11.4 Unless specifically designed and evaluated by the project structural engineer, where concrete paving will be utilized for support of vehicles, 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.

6.11.5 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 thickness at the slab edge and taper back to the design slab thickness 3 feet behind the face of the slab.

6.11.6 We recommend that at least 12 inches of Class 2 aggregate base be used below rigid concrete pavements. The aggregate base should be compacted to at least 95% relative compaction near optimum moisture content.

6.11.7 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.

6.11.8 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.
6.11.9 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.

6.11.10 Consideration should be given to the use of edge drains or similar mechanisms to control subsurface water and mitigate the potential for pavement subgrade to become wet and unstable. In general, the uphill side of pavements constructed in a cut condition would be most susceptible to seepage infiltrating the pavement subgrade and aggregate base layer. If implemented, the edge drains should be outlet to a controlled drainage facility or other location deemed suitable by the project civil engineer.

6.11.11 Asphalt pavement section recommendations for driveways and parking areas are based on the design procedures of Caltrans’ Highway Design Manual (HDM). It should be noted that most rational pavement design procedures are based on projected street or highway traffic conditions and, hence, may not be representative of vehicular loading that occurs in parking lots and driveways. Pavement proximity to landscape irrigation, reduced traffic speed and short turning radii increase the potential for pavement distress to occur in parking lots even though the volume of traffic is significantly less than that of an adjacent street. The HDM indicates that the resulting pavement sections for parking lots are minimized to keep initial costs down but are reasonable because additional AC surfacing can be added later, if needed, and generally without incurring traffic hazards or traffic handling problems. It is generally not economically feasible to design and construct the entire parking lot and driveways for the unique loading conditions previously described. Periodic maintenance of the pavement in these areas, therefore, should be anticipated.

### 6.12 Retaining Wall Design

6.12.1 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 6.12 summarizes the weights of the equivalent fluid based on the different design conditions.

<table>
<thead>
<tr>
<th>Condition</th>
<th>Equivalent Fluid Density</th>
</tr>
</thead>
<tbody>
<tr>
<td>Active</td>
<td>45 pcf</td>
</tr>
<tr>
<td>At-Rest</td>
<td>65 pcf</td>
</tr>
</tbody>
</table>
6.12.2 Unrestrained walls should be designed using the active case. Unrestrained walls are those that are allowed to rotate more than 0.001H (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 6.12. 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.

6.12.3 If deemed necessary by the project structural engineer or required by building code, retaining walls should be designed considering seismic lateral earth pressure. The seismic lateral earth pressure increment exerted on the wall should be a triangular distribution with a pressure of 25H (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.

6.12.4 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.

6.12.5 Retaining wall foundations may be designed in accordance with Section 6.7 or with the drilled shaft recommendations below.

6.12.6 Drilled shaft (pier) foundations for retaining walls should have a minimum diameter of 18 inches and minimum embedment depth of 15 feet. The upper 1 foot of piers below the ground surface should be neglected when calculating for vertical capacities. Allowable skin friction to resist axial compression loads may be used at 400 pounds per square foot. For uplift capacity, allowable skin friction may be assumed to be \( \frac{2}{3} \) of that in compression.

6.12.7 Piers should have a minimum center-to-center spacing of at least three pier diameters and any end bearing contribution should be ignored. Allowable passive pressure used to resist lateral movement may be assumed to be equal to a fluid weighing 300 pounds per cubic foot (pcf). The passive pressure may be applied over two diameters for drilled piers. Where not protected by pavement, passive resistance should be ignored for the upper 1 foot of site soils. 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.
6.12.8 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 construction methods may be required if localized dewatering is not successful. Temporary casings may be needed if loose or flowing sands are encountered.

6.12.9 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.

6.13 Surface Drainage

6.13.1 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.

6.13.2 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.

6.13.3 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.

6.13.4 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 three 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.
LEGEND:

B5  Approximate Boring Location
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 are presented as figures following the text in this appendix. The borings were located in the field using a measuring tape and existing reference points. Therefore, the exploration locations shown on Figure 2 are approximate.

Our subsurface exploration was performed on July 13, 2016 and included the drilling and sampling of existing soils with a Mobile B-56 drill rig equipped with 8-inch hollow-stem augers. Sampling in the borings was accomplished using a 140-pound wireline 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. Samples were collected at appropriate intervals, classified by our field engineer, retained in moisture-tight containers and transported to the laboratory for testing and further classification. The applicable type of each sampling interval is noted on the exploratory boring logs. Upon completion, our borings were backfilled in accordance with San Mateo County permit requirements.

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 log was revised based on subsequent laboratory testing.
### UNIFIED SOIL CLASSIFICATION

<table>
<thead>
<tr>
<th>Major Divisions</th>
<th>Typical Names</th>
<th>Gravels with or without gravel, little or no fines</th>
</tr>
</thead>
<tbody>
<tr>
<td>Clean gravels</td>
<td>G-W</td>
<td>GRAY 925.371.5900 – FAX 925.371.5915</td>
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<tr>
<td>GM</td>
<td>Silty gravels</td>
<td>6671 BRISA STREET – LIVERMORE, CA 94550</td>
</tr>
<tr>
<td>GC</td>
<td>Clayey gravels with sand</td>
<td></td>
</tr>
<tr>
<td>SW</td>
<td>Well graded sands with or without gravel, little or no fines</td>
<td></td>
</tr>
<tr>
<td>SM</td>
<td>Silty sands with or without gravel</td>
<td></td>
</tr>
<tr>
<td>SC</td>
<td>Clays with or without gravel</td>
<td></td>
</tr>
<tr>
<td>Ml</td>
<td>Organic silts and clays of low to medium plasticity</td>
<td></td>
</tr>
<tr>
<td>Cl</td>
<td>Organic silts and clays of medium to high plasticity</td>
<td></td>
</tr>
<tr>
<td>Ol</td>
<td>Organic silts and clays of medium to high plasticity</td>
<td></td>
</tr>
<tr>
<td>Mh</td>
<td>Organic clays of high plasticity</td>
<td></td>
</tr>
<tr>
<td>Ch</td>
<td>Organic clays of medium to high plasticity</td>
<td></td>
</tr>
<tr>
<td>Oh</td>
<td>Organic clays of medium to high plasticity</td>
<td></td>
</tr>
<tr>
<td>Pt</td>
<td>Peat and other highly organic soils</td>
<td></td>
</tr>
</tbody>
</table>

### BORING/TRENCH LOG LEGEND

- No Recovery
- Shelby Tube Sample
- Bulk Sample
- MIP Sample
- Modified California Sample
- Groundwater Level (At Completion)
- Groundwater Level (Closing)

### PENETRATION RESISTANCE

<table>
<thead>
<tr>
<th>Penetration Resistance</th>
<th>Blows/1000 lbs</th>
<th>Blow/50 lbs</th>
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</thead>
<tbody>
<tr>
<td>Very Loose</td>
<td>0 - 4</td>
<td>0 - 6</td>
</tr>
<tr>
<td>Loose</td>
<td>5 - 10</td>
<td>7 - 16</td>
</tr>
<tr>
<td>MEDIUM DENSE</td>
<td>11 - 30</td>
<td>17 - 48</td>
</tr>
<tr>
<td>Dense</td>
<td>31 - 60</td>
<td>49 - 79</td>
</tr>
<tr>
<td>VERY DENSE</td>
<td>OVER 60</td>
<td>OVER 79</td>
</tr>
</tbody>
</table>

### MOISTURE DESCRIPTIONS

<table>
<thead>
<tr>
<th>Field Test</th>
<th>APPROX. DEGREE OF SATURATION, %</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>None</td>
<td>0%</td>
<td>DRY</td>
</tr>
<tr>
<td>Slight</td>
<td>2.5%</td>
<td>SATURATED</td>
</tr>
<tr>
<td>Moist</td>
<td>5%</td>
<td>SATURATED</td>
</tr>
</tbody>
</table>

### QUANTITY DESCRIPTIONS

<table>
<thead>
<tr>
<th>Approx. Estimated Percent</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>-5%</td>
<td>TRACE</td>
</tr>
<tr>
<td>5 - 10%</td>
<td>FEW</td>
</tr>
<tr>
<td>11 - 25%</td>
<td>LITTLE</td>
</tr>
<tr>
<td>26 - 50%</td>
<td>SOME</td>
</tr>
<tr>
<td>&gt;50%</td>
<td>MOSTLY</td>
</tr>
</tbody>
</table>

### GRAVEL/CORBLE/BOULDER DESCRIPTIONS

**Criteria:**
- Pass through a 0.06-inch sieve and be retained on a 0.14-inch sieve (4:27)
- Will not pass a 0.12-inch square opening (1:5 by 1:2)

**Description:**
- Gravel
- Cobble
- Boulder
<table>
<thead>
<tr>
<th>DEPTH IN FEET</th>
<th>SAMPLE NO.</th>
<th>LITHOLOGY</th>
<th>SOIL CLASS (USCS)</th>
<th>ELEV. (MSL)</th>
<th>DATE COMPLETED</th>
<th>PENETRATION RESISTANCE (BLOWS/FT.)</th>
<th>DRY DENSITY (P.C.F.)</th>
<th>MOISTURE CONTENT (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td></td>
<td>CH</td>
<td>TERRACE DEPOSITS</td>
<td></td>
<td>7/13/2016</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Medium stiff, dry to damp, black, CLAY with sand</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>-stiff, moist, orange-brown mottled gray</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>-pp=1¾-2¼</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>B1-2.5-3</td>
<td></td>
<td>-more sand</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>B1-3</td>
<td></td>
<td>-pp=3¾-4½</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>B1-4-4.5</td>
<td></td>
<td>SAND</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>B1-4.5</td>
<td></td>
<td>Medium dense, moist, orange-gray speckled varicolored, Clayey (f-c)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>END OF BORING AT APPROXIMATELY 10 FEET</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>END OF BORING AT APPROXIMATELY 10 FEET</td>
<td></td>
<td></td>
<td>NO FREE WATER ENCOUNTERED</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>BACKFILLED WITH COMPACTED CUTTINGS</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Figure A2, Log of Boring B1, page 1 of 1

GEOCON BORING LOG E8940-04-01 BORING LOGS.GPJ 08/14/16

NOTE: THE LOG OF SUBSURFACE CONDITIONS SHOWN HEREIN APPLIES ONLY AT THE SPECIFIC BORING OR TRENCH LOCATION AND AT THE DATE INDICATED. IT IS NOT WARRANTED TO BE REPRESENTATIVE OF SUBSURFACE CONDITIONS AT OTHER LOCATIONS AND TIMES.

SAMPLE SYMBOLS
- : SAMPLING UNSUCCESSFUL
- : STANDARD PENETRATION TEST
- : DRIVE SAMPLE (UNDISTURBED)
- : DISTURBED OR BAG SAMPLE
- : CHUNK SAMPLE
- : WATER TABLE OR SEEPAGE
### BORING B2

**SOIL CLASS (USCS)**
- CL
- SC

**DEPTH**
- 0
- 1
- 2
- 3
- 4
- 5
- 6
- 7
- 8
- 9
- 10
- 11
- 12

**LITHOLOGY**
- TERRACE DEPOSITS
  - Stiff, damp, brown, (f-m) Sandy CLAY
    - very stiff, orange-gray and black, sand (f-c)
    - -pp>4½
  - stiff, black
  - Medium dense, moist, black, Clayey (f-c) SAND with few (f) gravels
  - -gravels generally sub-rounded to sub-angular
    - damp to moist, grayish-orange speckled varicolored, more clay, less gravels
    - -pp>4½

**DEMOGRAPHIC DATA**

<table>
<thead>
<tr>
<th>DEPTH IN FEET</th>
<th>SAMPLE NO.</th>
<th>LITHOLOGY</th>
<th>SOIL CLASS (USCS)</th>
<th>DEPTH</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
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<td>CL</td>
<td>TERRACE DEPOSITS</td>
<td></td>
</tr>
<tr>
<td>1</td>
<td></td>
<td>CL</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>B2-2.5-3</td>
<td>CL</td>
<td></td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>B2-3</td>
<td>SC</td>
<td></td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>B2-4-4.5</td>
<td>SC</td>
<td></td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>B2-4.5</td>
<td>SC</td>
<td></td>
<td></td>
</tr>
<tr>
<td>6</td>
<td>B2-9-9.5</td>
<td>SC</td>
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</tr>
<tr>
<td>7</td>
<td>B2-9.5</td>
<td>SC</td>
<td></td>
<td></td>
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</table>

**EQUIPMENT**
- Mobile B56 w/ 8-inch HSA
- Downhole-Wireline

**DATE COMPLETED**
- 7/13/2016

**DRILLER**
- EGI

**HARD DENSITY (P.C.F.)**
- 122.5
- 113.9

**MOISTURE CONTENT (%)**
- 10.0
- 16.5

**D R Y D E N S I T Y (BLOWS/FT.)**
- 36
- 41

**NOTE:**
The log of subsurface conditions shown herein applies only at the specific boring or trench location and at the date indicated. It is not warranted to represent subsurface conditions at other locations and times.
<table>
<thead>
<tr>
<th>DEPTH IN FEET</th>
<th>SAMPLE NO.</th>
<th>LITHOLOGY</th>
<th>SOIL CLASS (USCS)</th>
<th>ELEV. (MSL.)</th>
<th>DATE COMPLETED</th>
<th>PENETRATION RESISTANCE (BLOWS/FT.)</th>
<th>DRY DENSITY (P.C.F.)</th>
<th>MOISTURE CONTENT (%)</th>
</tr>
</thead>
<tbody>
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<td>13</td>
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<td>B2-14-14.5</td>
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<td>16</td>
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<td></td>
</tr>
<tr>
<td>17</td>
<td></td>
<td></td>
<td></td>
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<td></td>
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</tr>
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<td>22</td>
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<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
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<td>23</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>24</td>
<td>B2-24-25</td>
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<td></td>
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<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**MATERIAL DESCRIPTION**

- same

- dense

Hard, moist, orange-brown, CLAY with (f-c) sand -pp>4½

**NOTE:** The log of subsurface conditions shown hereon applies only at the specific boring or trench location and at the date indicated. It is not warranted to be representative of subsurface conditions at other locations and times.
<table>
<thead>
<tr>
<th>DEPTH</th>
<th>SAMPLE NO.</th>
<th>LITHOLOGY</th>
<th>SOIL CLASS (USCS)</th>
<th>DATE COMPLETED</th>
<th>PENETRATION RESISTANCE (BLOWS/FT.)</th>
<th>DRY DENSITY (P.C.F.)</th>
<th>MOISTURE CONTENT (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>25</td>
<td></td>
<td></td>
<td></td>
<td>7/13/2016</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**BORING B2**

**ENGINEER/GEOLOGIST**

**DRILLER**

**EQUIPMENT**

**HAMMER TYPE**

**GEOCON BORING LOG E8940-04-01 BORING LOGS.GPJ 08/14/16**

**NOTE:** THE LOG OF SUBSURFACE CONDITIONS SHOWN HEREIN APPLIES ONLY AT THE SPECIFIC BORING OR TRENCH LOCATION AND AT THE DATE INDICATED. IT IS NOT WARRANTED TO BE REPRESENTATIVE OF SUBSURFACE CONDITIONS AT OTHER LOCATIONS AND TIMES.

**PROJECT NO.: E8940-04-01**

**PROJECT NAME:** Coastside Fire Station No. 41

**SAMPLE SYMBOLS**

- **.: SAMPLING UNSUCCESSFUL**
- **.: STANDARD PENETRATION TEST**
- **.: DRIVE SAMPLE (UNDISTURBED)**
- **.: DISTURBED OR BAG SAMPLE**
- **.: CHUNK SAMPLE**
- **.: WATER TABLE OR SEEPAGE**

**MATERIAL DESCRIPTION**

- **SC**: Medium dense, moist, orange-gray, (f-m) SAND with little clay

---

**Figure A3, Log of Boring B2, page 3 of 4**
<table>
<thead>
<tr>
<th>DEPTH IN FEET</th>
<th>SAMPLE NO.</th>
<th>LITHOLOGY</th>
<th>SOIL CLASS (USCS)</th>
<th>DATE COMPLETED</th>
<th>PENETRATION RESISTANCE (BLOWS/FT.)</th>
<th>DRY DENSITY (P.C.F.)</th>
<th>MOISTURE CONTENT (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>38</td>
<td>38</td>
<td>SP-SC</td>
<td>Very dense, moist to wet, brown, (f-m) SAND with few clays</td>
<td>7/13/2016</td>
<td></td>
<td></td>
<td>78</td>
</tr>
<tr>
<td>39</td>
<td>39-40</td>
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<td></td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>40</td>
<td></td>
<td></td>
<td>END OF BORING AT APPROXIMATELY 40 FEET</td>
<td></td>
<td>GROUNDWATER INTIALLY ENCOUNTERED AT APPROXIMATELY 23 FEET BACKFILLED WITH COMPACTED CUTTINGS AND CEMENT</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Project Name:** Coastside Fire Station No. 41

**NOTE:** THE LOG OF SUBSURFACE CONDITIONS SHOWN HEREON APPLIES ONLY AT THE SPECIFIC BORING OR TRENCH LOCATION AND AT THE DATE INDICATED. IT IS NOT WARRANTED TO BE REPRESENTATIVE OF SUBSURFACE CONDITIONS AT OTHER LOCATIONS AND TIMES.
**Figure A4, Log of Boring B3, page 1 of 3**

<table>
<thead>
<tr>
<th>DEPTH IN FEET</th>
<th>SAMPLE NO.</th>
<th>LITHOLOGY</th>
<th>SOIL CLASS (USCS)</th>
<th>MATERIAL DESCRIPTION</th>
<th>PENETRATION RESISTANCE (BLOWS/FT.)</th>
<th>DRY DENSITY (P.C.F.)</th>
<th>MOISTURE CONTENT (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td></td>
<td>CL</td>
<td></td>
<td>TERRACE DEPOSITS</td>
<td>17</td>
<td>113.1</td>
<td>17.5</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Stiff, damp, dark brown, CLAY with (f-c) sand</td>
<td>23</td>
<td>109.4</td>
<td>18.1</td>
</tr>
<tr>
<td>1</td>
<td>B3-2.5-3</td>
<td></td>
<td></td>
<td>-damp to moist, orange-brown</td>
<td>113.1</td>
<td>17.5</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>-pp=3¾-3¾</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>B3-3</td>
<td></td>
<td></td>
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</tr>
<tr>
<td>3</td>
<td>B3-4-4.5</td>
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<td></td>
<td>-speckled white, more sand</td>
<td>109.4</td>
<td>18.1</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>-pp=3¾-4</td>
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<td></td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>B3-4.5</td>
<td></td>
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<td></td>
<td></td>
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<td></td>
</tr>
<tr>
<td>5</td>
<td>B3-9-10</td>
<td></td>
<td></td>
<td>-very stiff</td>
<td>113.1</td>
<td>17.5</td>
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</table>

**NOTE:**
The log of subsurface conditions shown herein applies only at the specific boring or trench location and at the date indicated. It is not warranted to be representative of subsurface conditions at other locations and times.
<table>
<thead>
<tr>
<th>DEPTH IN FEET</th>
<th>SAMPLE NO.</th>
<th>LITHOLOGY</th>
<th>SOIL CLASS (USCS)</th>
<th>DATE COMPLETED</th>
<th>PENETRATION RESISTANCE (BLOWS/FT.)</th>
<th>DRY DENSITY (P.C.F.)</th>
<th>MOISTURE CONTENT (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>13</td>
<td></td>
<td>SC</td>
<td>CL</td>
<td>7/13/2016</td>
<td>41</td>
<td>119.3</td>
<td>15.9</td>
</tr>
<tr>
<td>14</td>
<td>B3-14-4.5</td>
<td>SC</td>
<td>CL</td>
<td></td>
<td>41</td>
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<tr>
<td>15</td>
<td>B3-14.5</td>
<td></td>
<td></td>
<td></td>
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<td></td>
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<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>19</td>
<td>B3-19-20</td>
<td>CL</td>
<td></td>
<td></td>
<td>28</td>
<td></td>
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<td>20</td>
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<td></td>
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<tr>
<td>24</td>
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<td>SP-SC</td>
<td></td>
<td></td>
<td>30</td>
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</tr>
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Figure A4, Log of Boring B3, page 2 of 3

NOTE: THE LOG OF SUBSURFACE CONDITIONS SHOWN HEREON APPLIES ONLY AT THE SPECIFIC BORING OR TRENCH LOCATION AND AT THE DATE INDICATED. IT IS NOT WARRANTED TO BE REPRESENTATIVE OF SUBSURFACE CONDITIONS AT OTHER LOCATIONS AND TIMES.
**BORING B3**

- **DATE COMPLETED**: 7/13/2016
- **DRILLER**: EGI
- **EQUIPMENT**: Mobile B56 w/ 8-inch HSA
- **HAMMER TYPE**: Downhole-Wireline

<table>
<thead>
<tr>
<th>DEPTH IN FEET</th>
<th>SAMPLE NO.</th>
<th>LIQUIDITY</th>
<th>SOIL CLASS (USCS)</th>
<th>DATE COMPLETED</th>
<th>PENETRATION RESISTANCE (BLOWS/FT.)</th>
<th>DRY DENSITY (P.C.F.)</th>
<th>MOISTURE CONTENT (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>25</td>
<td>B3-25.5-26.5</td>
<td>-very dense</td>
<td></td>
<td>56</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>26</td>
<td></td>
<td></td>
<td></td>
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</tr>
<tr>
<td>27</td>
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<td>28</td>
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<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>29</td>
<td>B3-29-30</td>
<td></td>
<td></td>
<td>74</td>
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<td></td>
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<td>30</td>
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<td></td>
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</tr>
</tbody>
</table>

**GROUNDWATER**

- Initially encountered at approximately 13 feet, backfilled with compacted cuttings and cement.

**GROUNDWATER INITIAL ENCOUNTERED AT APPROXIMATELY 13 FEET BACKFILLED WITH COMPACTED CUTTINGS AND CEMENT**

**NOTE:**

The log of subsurface conditions shown herein applies only at the specific boring or trench location and at the date indicated. It is not warranted to be representative of subsurface conditions at other locations and times.
<table>
<thead>
<tr>
<th>DEPTH IN FEET</th>
<th>SAMPLE NO.</th>
<th>LITHOLOGY</th>
<th>SOIL CLASS (USCS)</th>
<th>ELEV. (MSL.)</th>
<th>DATE COMPLETED</th>
<th>PENETRATION RESISTANCE (BLOWS/FT.)</th>
<th>DRILLER</th>
<th>HAMMER TYPE</th>
<th>CONTENT (%)</th>
<th>MOISTURE CONTENT (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td></td>
<td>CL</td>
<td>TERRACE DEPOSITS</td>
<td></td>
<td></td>
<td></td>
<td>JBM</td>
<td>Mobile B56 w/ 8-inch HSA</td>
<td>16</td>
<td>105.9</td>
</tr>
<tr>
<td>1</td>
<td></td>
<td>CL</td>
<td>Stiff, damp to moist, orange-brown speckled varicolored, (f-c) Sandy CLAY</td>
<td>-pp&gt;4½</td>
<td></td>
<td></td>
<td>EGI</td>
<td>Downhole-Wireline</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>B4-2.5-3</td>
<td>CL</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>B4-3</td>
<td>ML</td>
<td>Stiff, damp to moist, black, SILT with clay and (f) sand</td>
<td>-pp=3-4½</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
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</tr>
<tr>
<td>4</td>
<td>B4-4-4.5</td>
<td>CL</td>
<td></td>
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<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>B4-4.5</td>
<td>CL</td>
<td>Stiff, moist, orange-brown speckled varicolored, CLAY with little (f-c) sand</td>
<td>-pp=2½-3</td>
<td></td>
<td></td>
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<td></td>
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</tr>
<tr>
<td>6</td>
<td>B4-5-10</td>
<td>SC</td>
<td>Dense, moist, gray mottled orange streaked rust, Clayey (f-c) SAND</td>
<td></td>
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<td></td>
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<tr>
<td>7</td>
<td>B4-9-9.5</td>
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<td>B4-9.5</td>
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Figure A5, Log of Boring B4, page 1 of 2

NOTE: THE LOG OF SUBSURFACE CONDITIONS SHOWN HEREIN APPLIES ONLY AT THE SPECIFIC BORING OR TRENCH LOCATION AND AT THE DATE INDICATED. IT IS NOT WARRANTED TO BE REPRESENTATIVE OF SUBSURFACE CONDITIONS AT OTHER LOCATIONS AND TIMES.
**BORING B4**

<table>
<thead>
<tr>
<th>DEPTH IN FEET</th>
<th>SAMPLE NO.</th>
<th>LITHOLOGY</th>
<th>SOIL CLASS (USCS)</th>
<th>DATE COMPLETED</th>
<th>PENETRATION RESISTANCE (BLOWS/FIT)</th>
<th>DRY DENSITY (P.C.F.)</th>
<th>MOISTURE CONTENT (%)</th>
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</thead>
<tbody>
<tr>
<td>13</td>
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<tr>
<td>14</td>
<td>B4-14-14.5</td>
<td>-medium dense, orange-gray</td>
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<td></td>
<td>42</td>
<td>111.7</td>
<td>18.5</td>
</tr>
<tr>
<td>15</td>
<td>B4-14.5</td>
<td>-same</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>16</td>
<td></td>
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<tr>
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</tbody>
</table>

**END OF BORING AT APPROXIMATELY 20 FEET NO FREE WATER ENCOUNTERED BACKFILLED WITH COMPACTED CUTTINGS**

---

**NOTE:** THE LOG OF SUBSURFACE CONDITIONS SHOWN HEREON APPLIES ONLY AT THE SPECIFIC BORING OR TRENCH LOCATION AND AT THE DATE INDICATED. IT IS NOT WARRANTED TO BE REPRESENTATIVE OF SUBSURFACE CONDITIONS AT OTHER LOCATIONS AND TIMES.
### BORING B5

**LITHOLOGY**
- TERRACE DEPOSITS
  - Stiff, damp, dark brown to black speckled varicolored, (f-c) Sandy CLAY
    - very stiff
    - pp>4½
  - orange-brown mottled gray
  - hard, damp to moist
    - pp>4½
  - more sand

**SOIL CLASS (USCS)**
- CL
- SC

**MATERIAL DESCRIPTION**
- Dense, damp to moist, orange-brown, Clayey (f-c) SAND

**DEPTH**
- 0
- 1
- 2
- 3
- 4
- 5
- 6
- 7
- 8
- 9
- 10

**SAMPLE NO.**
- B5-0-5
- B5-2.5
- B5-3
- B5-4-4.5
- B5-4.5
- B5-4.9-9.5
- B5-9-9.5
- B5-9.5

**ELEV. (MSL.)**
- 114.2
- 108.8
- 60
- 50
- 41
- 49
- 38
- 30

**DATE COMPLETED**
- 7/13/2016

**MOISTURE CONTENT (%)**
- 16.0
- 20.4
- 41
- 114.2

**DRY DENSITY (P.C.F.)**
- 108.8
- 114.2

**END OF BORING AT APPROXIMATELY 10 FEET**
- NO FREE WATER ENCOUNTERED
- BACKFILLED WITH COMPACTED CUTTINGS

---

Figure A6, Log of Boring B5, page 1 of 1

NOTE: THE LOG OF SUBSURFACE CONDITIONS SHOWN HEREON APPLIES ONLY AT THE SPECIFIC BORING OR TRENCH LOCATION AND AT THE DATE INDICATED. IT IS NOT WARRANTED TO BE REPRESENTATIVE OF SUBSURFACE CONDITIONS AT OTHER LOCATIONS AND TIMES.
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 moisture content, laboratory maximum dry density and optimum moisture content, grain size distribution, plasticity, expansion, unconfined compressive strength, shear strength and R-value. The results of our testing are summarized in tabular format below and the following figures. In-situ dry density and/or 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

<table>
<thead>
<tr>
<th>Sample No.</th>
<th>Liquid Limit</th>
<th>Plastic Limit</th>
<th>Plasticity Index</th>
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<tbody>
<tr>
<td>B1-2.5-3</td>
<td>71</td>
<td>28</td>
<td>43</td>
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<tr>
<td>B3-2.5</td>
<td>22</td>
<td>15</td>
<td>8</td>
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</tbody>
</table>

**TABLE B-II**
SUMMARY OF LABORATORY EXPANSION INDEX TEST RESULTS
ASTM D 4829

<table>
<thead>
<tr>
<th>Sample No.</th>
<th>Moisture Content</th>
<th>Dry Density* (pcf)</th>
<th>Expansion Index</th>
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<tbody>
<tr>
<td></td>
<td>Before Test (%)</td>
<td>After Test (%)</td>
<td></td>
</tr>
<tr>
<td>B5-0-5</td>
<td>11.0</td>
<td>22.6</td>
<td>106.2</td>
</tr>
</tbody>
</table>

*Before saturation

**TABLE B-III**
SUMMARY OF LABORATORY MAXIMUM DRY DENSITY AND OPTIMUM MOISTURE CONTENT TEST RESULTS
ASTM D 1557

<table>
<thead>
<tr>
<th>Sample No.</th>
<th>Soil Description</th>
<th>Maximum Dry Density (pcf)</th>
<th>Optimum Moisture Content (%)</th>
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</thead>
<tbody>
<tr>
<td>B4-5-10</td>
<td>Orange-brown CLAY with sand</td>
<td>117.9</td>
<td>11.8</td>
</tr>
</tbody>
</table>
### APPENDIX B
LABORATORY TESTING (cont.)

#### TABLE B-IV
SUMMARY OF LABORATORY DIRECT SHEAR TEST RESULTS
ASTM D 3080

<table>
<thead>
<tr>
<th>Boring No.</th>
<th>Sample Depth (feet)</th>
<th>Initial Average Dry Density (pcf)</th>
<th>Initial Average Moisture Content (%)</th>
<th>Cohesion (psf)</th>
<th>Angle of Shear Resistance (degrees)</th>
</tr>
</thead>
<tbody>
<tr>
<td>B3</td>
<td>4.5</td>
<td>109.4</td>
<td>18.1</td>
<td>620</td>
<td>26</td>
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<tr>
<td>B4</td>
<td>5-10</td>
<td>107.8</td>
<td>13.0</td>
<td>270</td>
<td>26</td>
</tr>
<tr>
<td>B4</td>
<td>9.5</td>
<td>116.1</td>
<td>15.0</td>
<td>1180</td>
<td>24</td>
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</tbody>
</table>

#### TABLE B-V
SUMMARY OF LABORATORY R-VALUE TEST RESULTS
ASTM D 2844

<table>
<thead>
<tr>
<th>Sample No.</th>
<th>Soil Type (USCS Classification)</th>
<th>R-Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>B5-0-5</td>
<td>Sandy CLAY (CL)</td>
<td>5</td>
</tr>
</tbody>
</table>
### Particle Size Analysis - ASTM D422

Project: Coastside Fire Station No. 41  
Location: Half Moon Bay, California  
Project No.: E8940-04-01  

Geocon Consultants, Inc.  
6671 Brisa Street  
Livermore, CA 94550  
Telephone: (925) 371-5900  
Fax: (925) 371-5915

---

**Test Data**

<table>
<thead>
<tr>
<th>Sieve Number</th>
<th>1 1/2&quot;</th>
<th>1&quot;</th>
<th>3/4&quot;</th>
<th>1/2&quot;</th>
<th>3/8&quot;</th>
<th>#4</th>
<th>#8</th>
<th>#16</th>
<th>#30</th>
<th>#50</th>
<th>#100</th>
<th>#200</th>
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</thead>
<tbody>
<tr>
<td>% Passing</td>
<td>100.0</td>
<td>100.0</td>
<td>100.0</td>
<td>100.0</td>
<td>97.3</td>
<td>93.4</td>
<td>86.9</td>
<td>76.8</td>
<td>65.3</td>
<td>52.3</td>
<td>41.3</td>
<td>33.9</td>
</tr>
</tbody>
</table>

---

**Graph**

- **Axes**: PERCENT PASSING vs. GRAIN SIZE (mm)  
- **Legend**:  
  - COBBLES: coarse, fine  
  - GRAVEL: coarse, fine  
  - SAND: coarse, medium, fine  
  - SILT OR CLAY: coarse, fine  

---

**Notes**

- **Boring**: B2  
- **Depth To Sample**: 4-4.5'  
- **Sieve Date**: 08/01/2016  
- **Tested and Computed by**: VV/CO
Test Data

<table>
<thead>
<tr>
<th>Sieve Number</th>
<th>1 1/2&quot;</th>
<th>1&quot;</th>
<th>3/4&quot;</th>
<th>1/2&quot;</th>
<th>3/8&quot;</th>
<th>#4</th>
<th>#8</th>
<th>#16</th>
<th>#30</th>
<th>#50</th>
<th>#100</th>
<th>#200</th>
</tr>
</thead>
<tbody>
<tr>
<td>% Passing</td>
<td>100.0</td>
<td>100.0</td>
<td>100.0</td>
<td>100.0</td>
<td>100.0</td>
<td>99.7</td>
<td>97.3</td>
<td>89.9</td>
<td>80.1</td>
<td>69.3</td>
<td>58.8</td>
<td>49.6</td>
</tr>
</tbody>
</table>

Geocon Consultants, Inc.
6671 Brisa Street
Livermore, CA 94550
Telephone: (925) 371-5900
Fax: (925) 371-5915

Particle Size Analysis - ASTM D422
Project: Coastside Fire Station No. 41
Location: Half Moon Bay, California
Project No.: E8940-04-01

Figure B2
### Test Data

<table>
<thead>
<tr>
<th>Sieve Number</th>
<th>1 1/2&quot;</th>
<th>1&quot;</th>
<th>3/4&quot;</th>
<th>1/2&quot;</th>
<th>3/8&quot;</th>
<th>#4</th>
<th>#8</th>
<th>#16</th>
<th>#30</th>
<th>#50</th>
<th>#100</th>
<th>#200</th>
</tr>
</thead>
<tbody>
<tr>
<td>% Passing</td>
<td>100.0</td>
<td>100.0</td>
<td>100.0</td>
<td>100.0</td>
<td>99.8</td>
<td>96.0</td>
<td>85.4</td>
<td>72.5</td>
<td>56.7</td>
<td>42.0</td>
<td>31.3</td>
<td></td>
</tr>
</tbody>
</table>

### Test Data

- **Boring**: B3
- **Depth To Sample**: 14-14.5'
- **Sieve Date**: 08/01/2016
- **Tested and Computed by**: VV/CO

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Particle Size Analysis - ASTM D422
- **Project**: Coastside Fire Station No. 41
- **Location**: Half Moon Bay, California
- **Project No.**: E8940-04-01

Figure B3
Boring: B4
Depth To Sample: 9-9.5'
Sieve Date: 08/01/2016
Tested and Computed by: VV/CO

Test Data

<table>
<thead>
<tr>
<th>Sieve Number</th>
<th>1 1/2&quot;</th>
<th>1&quot;</th>
<th>3/4&quot;</th>
<th>1/2&quot;</th>
<th>3/8&quot;</th>
<th>#4</th>
<th>#8</th>
<th>#16</th>
<th>#30</th>
<th>#50</th>
<th>#100</th>
<th>#200</th>
</tr>
</thead>
<tbody>
<tr>
<td>% Passing</td>
<td>100.0</td>
<td>100.0</td>
<td>100.0</td>
<td>100.0</td>
<td>100.0</td>
<td>99.2</td>
<td>94.5</td>
<td>81.7</td>
<td>68.5</td>
<td>51.7</td>
<td>36.9</td>
<td>25.0</td>
</tr>
</tbody>
</table>

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Particle Size Analysis - ASTM D422
Project: Coastside Fire Station No. 41
Location: Half Moon Bay, California
Project No.: E8940-04-01

Figure B4
**Test Data**

<table>
<thead>
<tr>
<th>Sieve Number</th>
<th>1 1/2&quot;</th>
<th>1&quot;</th>
<th>3/4&quot;</th>
<th>1/2&quot;</th>
<th>3/8&quot;</th>
<th>#4</th>
<th>#8</th>
<th>#16</th>
<th>#30</th>
<th>#50</th>
<th>#100</th>
<th>#200</th>
</tr>
</thead>
<tbody>
<tr>
<td>% Passing</td>
<td>100.0</td>
<td>100.0</td>
<td>100.0</td>
<td>100.0</td>
<td>100.0</td>
<td>99.9</td>
<td>98.8</td>
<td>92.7</td>
<td>83.6</td>
<td>72.2</td>
<td>62.5</td>
<td>55.8</td>
</tr>
</tbody>
</table>

**Boring:** B5  
**Sieve Date:** 08/01/2016  
**Depth To Sample:** 2.5’  
**Tested and Computed by:** VV/CO
### Sample Description

<table>
<thead>
<tr>
<th>Sample Number</th>
<th>Boring Number</th>
<th>B4</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sample Depth (feet)</td>
<td>4.5'</td>
<td></td>
</tr>
<tr>
<td>Material Description</td>
<td>Dark Orange-brown CLAY with (f-c) Sand</td>
<td></td>
</tr>
</tbody>
</table>

### Initial Conditions at Start of Test

<table>
<thead>
<tr>
<th>Condition</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Height (inch) average of 3</td>
<td>5.86</td>
</tr>
<tr>
<td>Diameter (inch) average of 3</td>
<td>2.39</td>
</tr>
<tr>
<td>Moisture Content (%)</td>
<td>20.5</td>
</tr>
<tr>
<td>Dry Density (pcf)</td>
<td>105.9</td>
</tr>
<tr>
<td>Estimated Specific Gravity</td>
<td>2.7</td>
</tr>
<tr>
<td>Saturation (%)</td>
<td>93.8</td>
</tr>
</tbody>
</table>

### Shear Test Conditions

<table>
<thead>
<tr>
<th>Condition</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Strain Rate (%/min)</td>
<td>1.1810</td>
</tr>
<tr>
<td>Major Principal Stress at Failure (psf)</td>
<td>3600</td>
</tr>
<tr>
<td>Strain at Failure (%)</td>
<td>15.9</td>
</tr>
</tbody>
</table>

### Test Results

<table>
<thead>
<tr>
<th>Condition</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Unconfined Compressive Strength (tons/ft²)</td>
<td>1.8</td>
</tr>
<tr>
<td>Unconfined Compressive Strength (lbs/ft²)</td>
<td>3600</td>
</tr>
<tr>
<td>Shear Strength (tons/ft²)</td>
<td>0.9</td>
</tr>
<tr>
<td>Shear Strength (lbs/ft²)</td>
<td>1800</td>
</tr>
</tbody>
</table>

---

**Figure B6**

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**Unconfined Compressive Strength (ASTM D2166)**

**Project:** Coastside Fire Station #41

**Location:** Half Moon Bay, California

**Project No.:** E8940-04-01
LIST OF REFERENCES


California Geological Survey (CGS) and USGS Quaternary Faults and Folds database: http://geohazards.usgs.gov/qfaults/map.php


USGS interactive mapping: Liquefaction Susceptibility Map of the San Francisco Bay Area, online: http://geomaps.wr.usgs.gov/sfgeo/liquefaction/susceptibility.html (interactive mapping was the result of a cooperative project between the USGS and the CGS and is based on information presented in USGS Open File Report Nos. 2006-1037 and 00-444).

USGS, Quaternary Faults and Folds Database of the United States: http://earthquake.usgs.gov/hazards/qfaults/map/


Unpublished reports, aerial photographs and maps on file with Geocon.